OptoLyzer® Studio User's Guide

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Chapter 1 Preface

1.1 Intended Use

This K2L product is intended to be used for developing, testing, or analyzing CAN® - and LIN® based products and systems by persons with experience in developing such bus systems.

1.2 Delivery

The OptoLyzer® Studio is provided either stand-alone, i.e., without hardware (Section 1.2.1) or with hardware (Section 1.2.2).

1.2.1 OptoLyzer Studio

If the software is delivered without hardware, the software has to be downloaded from our web site: http://www.K2L.de. A ticket number will be provided via e-mail that allows to activate a license key.

Notes: A license can only be activated if the OptoLyzer Studio has been installed.

1.2.2 OptoLyzer Studio and Hardware

Depending on the purchase order the shipment covers:

- one of the following hardware devices:
  - OptoLyzer MOCCA compact 50e (supporting CAN and/or LIN)
  - OptoLyzer MOCCA compact 150o (supporting CAN and/or LIN)
  - OptoLyzer MOCCA compact 150c (supporting CAN and/or LIN)
  - OptoLyzer MOCCA CLF (supporting CAN and/or LIN)

Microchip's CAN Bus Analyzer (supported in the OptoLyzer Studio Entry Edition) is not part of the shipment. It has to be ordered separately via the MCHP website.

- Installation CD including:
  - Installer of the OptoLyzer Studio
  - Installer of the K2L Flasher including appropriate firmware files
  - Documentation
  - Ticket that allows to enable a license key
  - CmDongle (if ordered)

Check your shipment for completeness. If you have any objections direct them to sales.tools@K2L.de. Providing the delivery note number eases the handling.

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1.2.3 OptoLyzer Studio Editions and Their Feature Sets

The feature sets of the OptoLyzer Studio editions are shown in Table 1.1 and described in the sections below.

Table 1.1 OptoLyzer Studio Editions

EDITION	OptoLyzer MOCCA compact			OptoLyzer MOCCA CLF	CAN Bus Analyzer	COMPONENTS/ USE CASES
	50e	150o	150c			
Lite						■ Simple offline analysis ■ No HW support
Entry					X	■ Lite Edition functionality inclusive ■ Online/offline analysis ■ Basic message sending - Single message sending - Cyclic message sending ■ Storing of online traces ■ Support of Microchip's CAN Bus Analyzer
Foundation CL	X	X	X	X	X	■ Entry Edition functionality inclusive ■ Enhanced online/offline analysis ■ Complex activities ■ Filtering ■ Support of CAN/LIN catalogs ■ Support of OptoLyzer MOCCA devices according to Section 1.2.2

1.2.3.1 OptoLyzer Studio Lite Edition

There is a free of charge variant of the OptoLyzer Studio available that allows viewing of existing files without any hardware support. To use this version just download the OptoLyzer Studio software without activating a license key.

1.2.3.2 OptoLyzer Studio Entry Edition

This version enables the user to interact with CAN Bus Analyzer using simply activities and start/save log sessions. Additionally, all functions of the OptoLyzer Studio Lite Edition are available.

1.2.3.3 OptoLyzer Studio Foundation CL Edition

This version enables the user to interact with OptoLyzer MOCCA devices using the OptoLyzer Studio and define complex activities. Also a graph, plenty of trace view functionalities and both simple and complex filters are available. Additionally, all functions of the OptoLyzer Studio Entry Edition are available. CAN and LIN bus systems are supported.

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1.3 Definitions of Terms

For better understanding of the following chapters, this section provides explanation to special terms, used within this getting started.

Table 1.2 Definitions of Terms

TERM / ABBREVIATION	DESCRIPTION
CAN®	Controller Area Network
CBA	CAN Bus Analyzer, a hardware device developed by Microchip
CodeMeter®	State-of the-art software protection provided by Wibu Systems. This technology allows flexible software licensing.
CmActLicence	The license is transferred to a computer (PC). The license is associated with some properties of the computer.
CmDongle	The license is fully transferred to a dongle (CmDongle). This allows to use the license on different computers.
CmStick	Stick that belongs to the CodeMeter technology, formerly known as hardware dongle. It is a standard-sized USB CmStick, computer-independent, housed in plastic or metal, embeds a smart card chip, supports complete license model spectrum.
DUT	Device Under Test
Graph	A graph shows the values of one or several dedicated messages, events in a chronological sequence in a graphical manner.
HW	Hardware
LIN®	Local Interconnect Network
MDI	Multi document interface
*.olsactivity	OptoLyzer Studio stores activity files using this file extension.
*.olsfilter	OptoLyzer Studio stores filter files using this file extension.
*.olslog	OptoLyzer Studio stores log files using this file extension.
*.olsworkspace	OptoLyzer Studio stores workspaces using this file extension.
OS	Operating system
Payload	Properties of interest are mostly arranged in the body of a message (called Payload in the OptoLyzer Studio) and can be structured with the help of catalogs.
USB	Universal Serial Bus

1.4 References

[1] OptoLyzer® MOCCA compact V3.1 User Manual
http://www.K2L.de

[2] CAN Bus Analyzer User's Guide
http://www.microchip.com

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Chapter 2 Introduction

The OptoLyzer Studio is a modern analysis software, that allows monitoring, testing and analyzing data traffic either in a CAN bus or in a LIN bus system or in both bus systems in parallel. In addition, message generation and sending is supported as well. It is an easy to handle user software based on an intuitive usage concept. The OptoLyzer Studio can operate with different hardware interfaces. The software offers both on- and offline analysis of the supported bus systems.

There is also a free of charge variant of the OptoLyzer Studio available that allows viewing of existing files without any hardware support.

Files recorded in OptoLyzer Studio (*.olslog) and real network traffic of CAN and LIN bus systems can serve as data sources.

The user interface of the software is designed according to modern usability guidelines including MDI, docking and ribbons and various customization possibilities inclusive simplified drag & drop functionality across different windows within the OptoLyzer Studio whenever it make sense.

The OptoLyzer Studio offers the appropriate function for each use case, basic but powerful functions for beginners and detailed and individual functions for advanced users.

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2.1 Features

- Monitoring support of CAN and LIN bus systems
- Unlimited size of log files depending on PC hardware
- Support of online and offline analysis and verification
- Visualization of each message property
- Multiple hardware support
- Configuration of connected hardware interfaces
- Powerful and flexible filtering
- Graphical representation of message properties and signal values
- Diverse zoom features in a Graph to focus on interesting message series
- Recording of CAN and LIN messages
- Message generation for CAN and LIN bus systems
- Smart GUI customization according to user's preferences
- Sustainable expandability
  - 3rd party -, new Microchip -, new K2L hardware
  - Additional bus systems and protocols
  - Envelope/body concept
  - Log file formats
  - Catalogs/description formats

2.2 PC System Requirements

The following environment (minimum) is recommended for installation:

1. Dual core processor with at least 2.66 GHz
2. 4 GByte RAM
3. 1 GByte free disk space (additional storage for recording required)
4. Network access for e.g., downloading the software, activation the license
5. USB2.0 High Speed for connecting a CBA and/or OptoLyzer MOCCA devices
6. Windows 7 (64 bits), Windows 8 and Windows 8.1 operating system

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Chapter 3 Installation

This chapter describes the steps how to install the OptoLyzer Studio. Three use cases can be distinguished.

1. You have purchased the OptoLyzer Studio together with a hardware. In this case the software is provided on a CD. The installation is described below starting in Section 3.1.
2. You have purchased the OptoLyzer Studio only, i.e., without a hardware. In this case the software has to be downloaded from our web site: http://www.K2L.de. To follow the installation steps below (starting with Section 3.1) you have to execute the following preparation steps:
   a. Enter http://www.K2L.de in a browser.
   b. Navigate to **Products** and then to **Solutions**.
   c. Select **OptoLyzer Studio** and switch to the **Downloads** section.
   d. Download the **OptoLyzer Studio** software and unzip the file on your hard drive.
3. You have downloaded the OptoLyzer Studio from our web site: http://www.K2L.de for viewing and test purposes. In this case the installation will follow the same procedure as for 2. including the preparation steps a. to d. but without activating a license. As a consequence the OptoLyzer Studio is running as a free of charge version and allows only viewing of files (OptoLyzer Studio Lite Edition).

3.1 Check the System Type of the Operating System

There are two installers:

- OptoLyzerStudioSetup_x86.msi: This installer is designated to be installed on a 32-bit operating system (OS).
- OptoLyzerStudioSetup_x64.msi: This installer is designated to be installed on a 64-bit operating system.

To install the proper version of the OptoLyzer Studio the system type of the operating system (OS) has to be known. To check the type of the OS follow these steps (described for Windows 7):

- Click on the **Start** button.
- Right-click on **Computer** and select **Properties**.
- View **System Type** and check whether you are using a 32-bit OS or a 64-bit OS.

3.2 Installation of the OptoLyzer Studio

1. Login in as a user with **administrator** rights on the PC or Laptop.
2. Navigate to the source of the OptoLyzer Studio. There are two possibilities:
   - If you got a CD within your shipment: Insert the OptoLyzer Studio CD in a CD drive of the PC and navigate to the installation folder.
   - If you have downloaded the software: Navigate to the folder the downloaded software is stored.
3. Depending on which system type of the OS you are using (see Section 3.1), double-click either **OptoLyzerStudioSetup_x86.msi** or **OptoLyzerStudioSetup_x64.msi**.
4. Install it on the PC. Follow the instructions.
5. Remove the CD if necessary.

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3.3 Licensing

In order to access all functions of the OptoLyzer Studio a license key has to be activated. There are two methods to activate the license:

- Dongle license named **CmDongle** in the following sections. The license is kept on a CmDongle and can be used on several PCs by plugging the CmDongle in the respective PC.
- PC license named **CmActLicense** in the following sections. The license is associated with some properties of a PC to which the license was transferred.

3.3.1 Activate a License Online

Follow the steps below for activating a license:

1. Plug the **CmDongle** in an USB port of the PC. This hardware dongle is part of the shipment. The operating system installs the corresponding device drivers.
   You can skip this step if you ordered a PC license (**CmActLicense**).
2. Start **OptoLyzer Studio**, i.e., click 'Start | Programs | K2L | OptoLyzer Studio | OptoLyzer Studio'.
3. Click **File** in the menu bar and select **Options**. The **Options** window opens.
4. In the left panel of the **Options** window select **License**. The right part of the window shows information about the licensing and a **License Central** link.
5. Click **License Central** (alternatively enter http://www.k2l.de/license-central in a browser). The **CodeMeter License Central WebDepot** webpage opens. This webpage allows entering and maintaining the licenses of the OptoLyzer Studio editions.

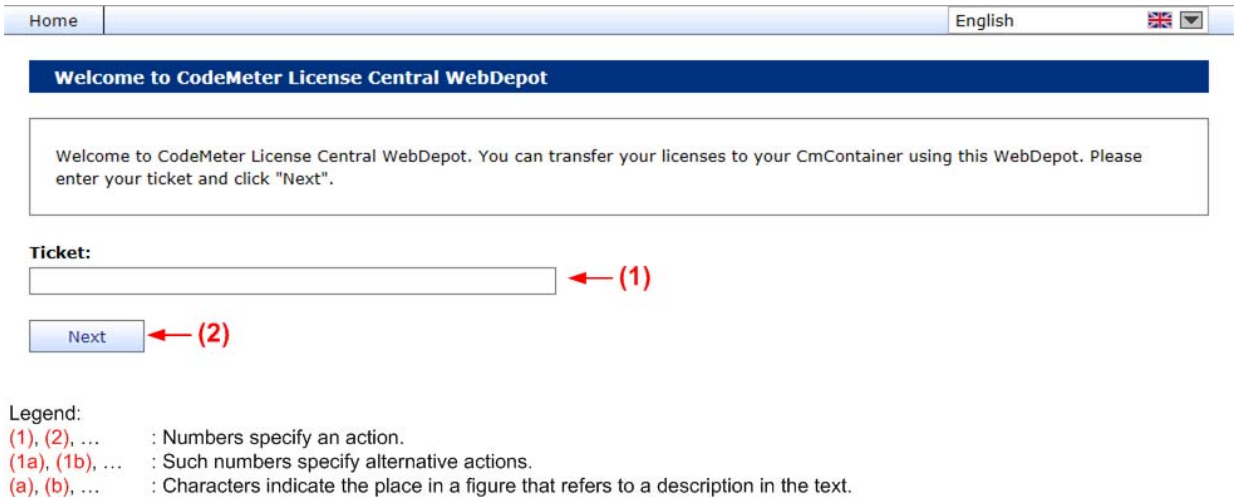
Home
English
Welcome to CodeMeter License Central WebDepot
Welcome to CodeMeter License Central WebDepot. You can transfer your licenses to your CmContainer using this WebDepot. Please enter your ticket and click "Next".
Ticket:
(1)
Next
(2)
Legend:
(1), (2), … : Numbers specify an action.
(1a), (1b), … : Such numbers specify alternative actions.
(a), (b), … : Characters indicate the place in a figure that refers to a description in the text.

Figure 3.1 Add Ticket

6. **Enter** your **ticket** in this form **(1)** and click **Next (2)**. The ticket has been provided after purchasing OptoLyzer Studio together with a CmDongle (known previously as hardware dongle).

Notes: If you don't have a ticket, contact support@K2L.de.

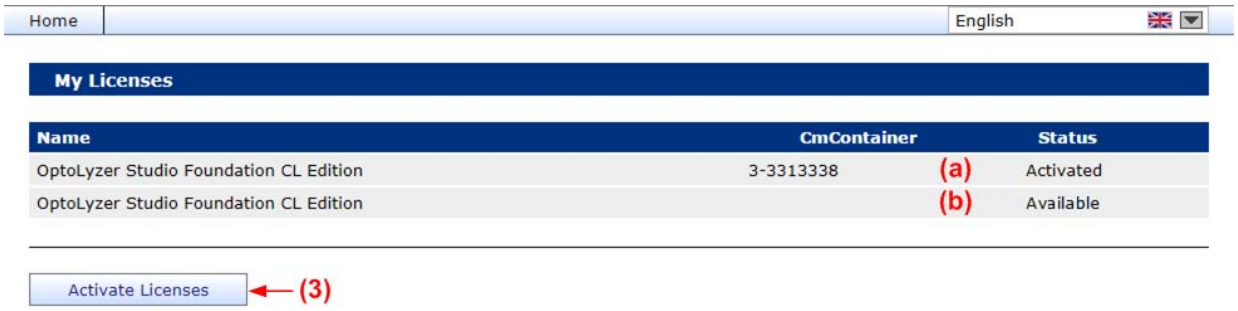

Figure 3.2 Activate Licenses - Example

7. Another window opens that provides an overview about activated **CmContainers** (a container holds a license) **(a)** and available **CmContainers (b)**. In addition, the window informs about which OptoLyzer Studio Edition refers to a ticket. In the example in Figure 3.2 one **CmContainer** has been activated, another one is still available. Click **Activate Licenses (3)**.

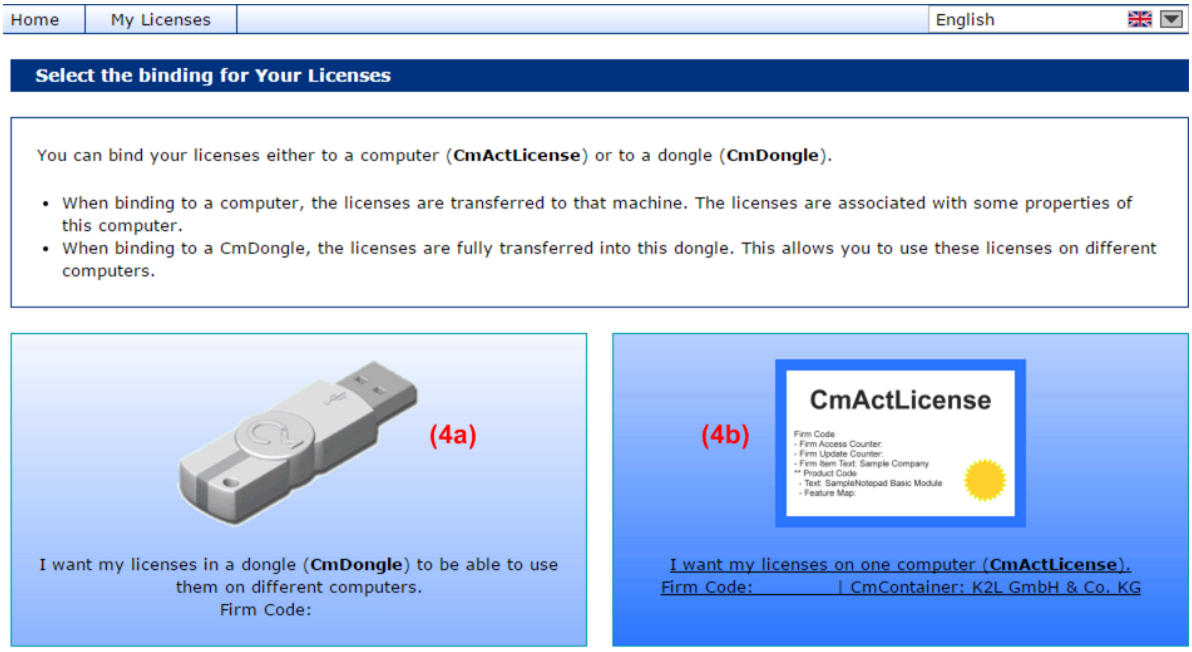
Home
My Licenses
English
Select the binding for Your Licenses
You can bind your licenses either to a computer (CmActLicense) or to a dongle (CmDongle).
When binding to a computer, the licenses are transferred to that machine. The licenses are associated with some properties of this computer.
When binding to a CmDongle, the licenses are fully transferred into this dongle. This allows you to use these licenses on different computers.
(4a)
I want my licenses in a dongle (CmDongle) to be able to use them on different computers.
Firm Code:
(4b)
CmActLicense
I want my licenses on one computer (CmActLicense).
Firm Code:
CmContainer: K2L GmbH & Co. KG

Figure 3.3 Select Kind of License

In the next window it has to be specified either to bind the license to a dongle or to a computer. It depends on what has been purchased.

- Binding to a dongle (CmDongle) means that the license is fully transferred into a dongle. The license can be used on different PCs.
- Binding to a PC (CmActLicense) means that the license is transferred to a PC.

8. Click either the **CmDongle (4a)** icon or the **CmActLicense (4b)** icon.

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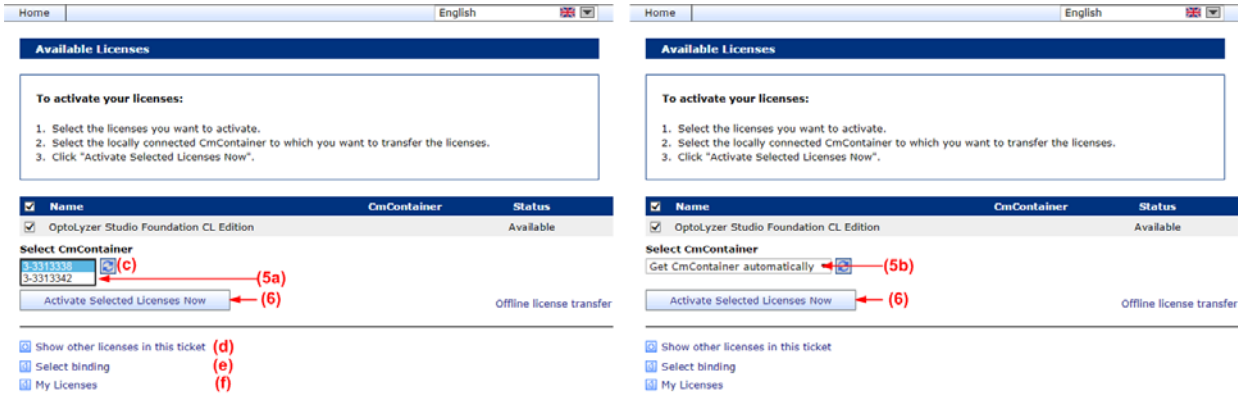

Figure 3.4 Select CmContainer - Example

The figure above depicts the window for the CmDongle on the left side and the window for the CmActLicense on the right side. In addition, you can show other licenses in the ticket **(d)** or switch back to the binding selection **(e)** or to My Licenses **(f)**.

9. - For the **CmDongle** click the **arrow** in the **drop-down box** and select a **CmContainer (5a)**. If no **CmContainers** are visible, the button next to the drop-down box allows to refresh the view **(c)**. After selecting the **CmContainer** of interest click **Activate Selected Licenses Now (6)**.
   - For the **PC license** no Container has to be selected, as the Container is automatically transferred **(5b)** when pressing the button below. To proceed click **Activate Selected Licenses Now (6)**.

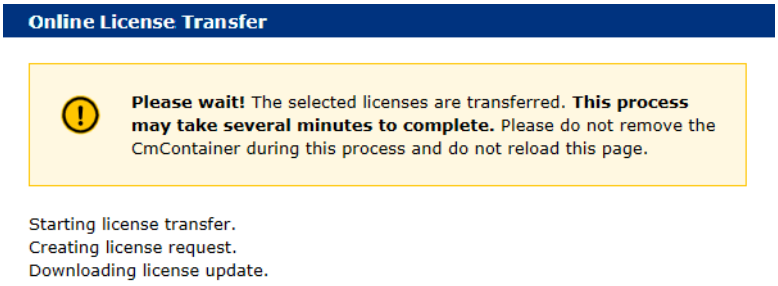
Online License Transfer
Please wait! The selected licenses are transferred. This process may take several minutes to complete. Please do not remove the CmContainer during this process and do not reload this page.
Starting license transfer.
Creating license request.
Downloading license update.

Figure 3.5 Online License Transfer

10. An online license transfer starts that may not be stopped. Follow the instructions in the window, i.e., wait till transfer ends. A second window opens afterwards.

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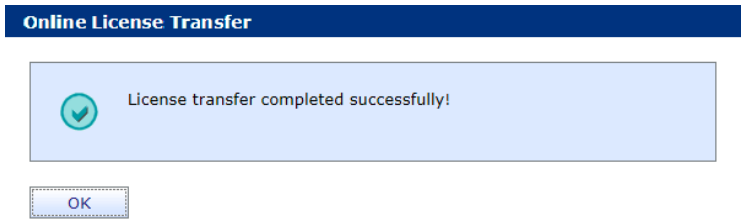

Figure 3.6 Online License Transfer Succeeded

11. Click **OK** to complete activating the license. If another license is available, it can be activated in the same way as described above.

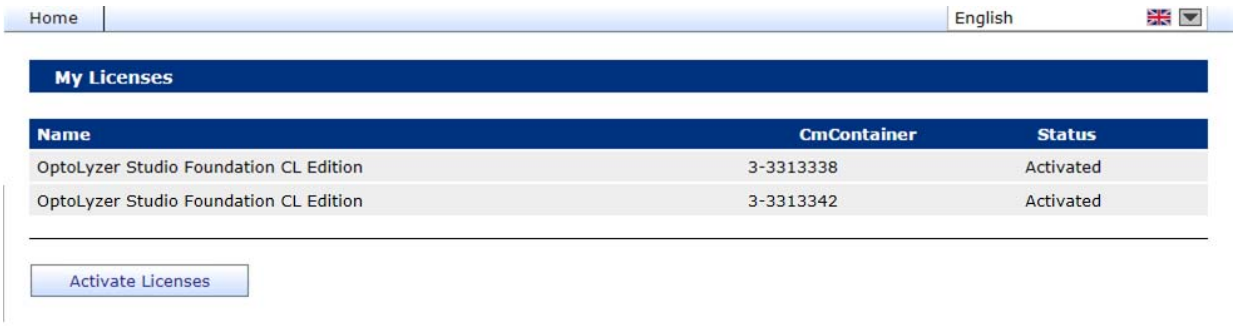

Figure 3.7 Activate Another License If Available - Example

12. Click **File** in the menu bar of the OptoLyzer Studio and select **Options**. The Options window opens.
13. Select **License** in the Options window.

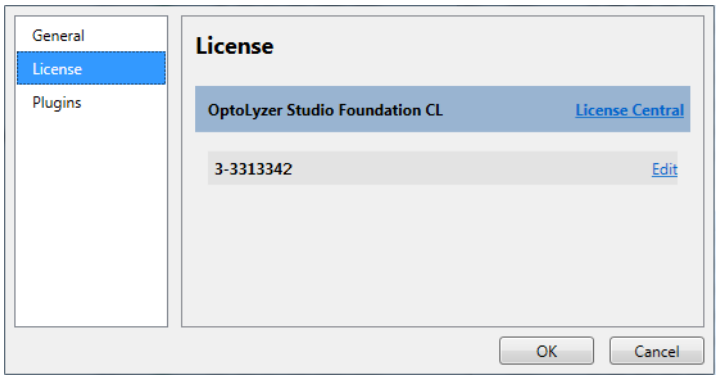

Figure 3.8 Activate License in License Tab - Example

The activated license is visible in the license window. The license itself can be controlled in the **CodeMeter Control Center** when clicking **Edit** in the window.

3.4 Hardware Preparation

3.4.1 OptoLyzer MOCCA Device

3.4.1.1 Flasher Software

Flasher software must be installed when the firmware (like CPU, FPGA,...) must be updated in the OptoLyzer MOCCA compact. Follow these steps:

1. Remove all existing K2L Flasher installations on the PC.
2. Click **Install K2L Flasher V6.0.X** to run the installer. It can be found on the CD or on the K2L website (web site: http://www.K2L.de).
3. Select **Next** and follow the instructions. The software will be installed in Program Files/K2L.

3.4.1.2 OptoLyzer MOCCA Device Software Update

After the Flasher software is installed the firmware can be flashed.

1. Go to the Start menu and select **All Programs | K2L | K2L.Flasher | K2L Flasher**. The Flasher software starts.
2. OptoLyzer MOCCA device needs to be in Flash mode. That could be done in two ways:
   a. By clicking link on the flasher **Try to set the device into Flash mode by software**.
   b. By pressing the **Program Reset button** for about two seconds, until the 'OP' LED shows red. When releasing the button, the 'Active' LED must blink very quickly.
3. Click **Select File** to select the proper firmware flasher file: **Browse** the CD and select the following file (where XX represents the current version on the CD):

   C:\Program Files (x86)\K2L\OptoLyzer Studio\Firmware\OptoLyzer MOCCA\ABI-V04.08.XX.mca
4. Click **Flash Hardware** to run the process. Do not interrupt flashing!

   Flashing is done when the relay of the OptoLyzer MOCCA device stops toggling. In addition, the software shows the progress and the flashing result: **Passed** (all software packages do present a green check mark).

Notes: If the process does not start correctly, close the K2L Flasher software, cycle power on the OptoLyzer MOCCA device and unplug/connect the USB cable. Restart the K2L Flasher software. Afterwards click **Flash**.

5. After flashing close the Flasher software, cycle power on the OptoLyzer MOCCA device and unplug/plug the USB cable.

3.4.2 CAN Bus Analyzer

Microchip's CAN Bus Analyzer is ready for run and does not need an update.

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3.5 Connection Diagram for Online Viewing

Online viewing requires that at least one of the supported hardware devices (Section 1.2.2, "OptoLyzer Studio and Hardware," on page 8) is available and connected to the PC on which the OptoLyzer Studio is running.

3.5.1 OptoLyzer Studio Used in Combination with OptoLyzer MOCCA Device

A principle connection diagram is shown below. The devices' power supply (PC, monitor, OptoLyzer MOCCA device and DUT) have been omitted in the diagram.

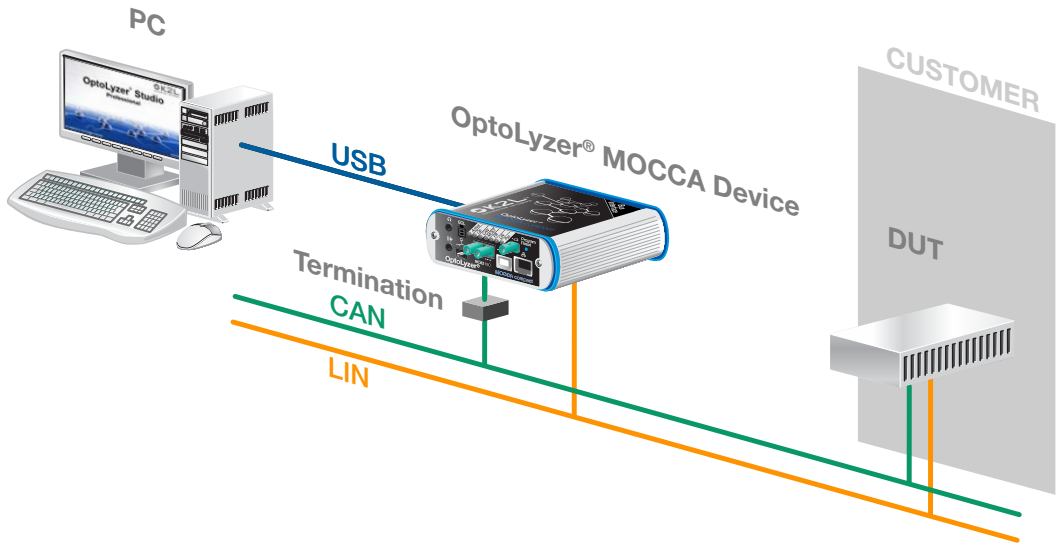

Figure 3.9 Connection Diagram when Used with OptoLyzer MOCCA Device

Follow these steps to connect the OptoLyzer Studio properly when using in combination with an OptoLyzer MOCCA device (Section 1.2.2, "OptoLyzer Studio and Hardware," on page 8).

1. Connect the OptoLyzer MOCCA device via the delivered USB cable to the PC on which the OptoLyzer Studio is running. The respective USB driver has been installed together with the OptoLyzer Studio.
2. Connect the OptoLyzer MOCCA device to the CAN bus respectively to the LIN bus. For details about how to connect the bus systems refer to [1].

Notes: Keep in mind to use a termination impedance when connecting the CAN bus to the OptoLyzer MOCCA device. The termination impedance is not part of the shipment and has to be provided at customer side.

3. Connect the DUT to the CAN bus respectively to the LIN bus.

Notes: In opposite to the Figure 3.9 it is also possible to have two DUT devices on customer side, one of them is connected to the CAN bus and the other one is connected to the LIN bus.

4. Power all devices.

The system is ready to be viewed and analyzed.

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3.5.2 OptoLyzer Studio Used in Combination with CAN Bus Analyzer

A principle connection diagram is shown below. The devices' power supply (PC, monitor and DUT) have been omitted in the diagram. The CAN Bus Analyzer is powered via the USB connection.

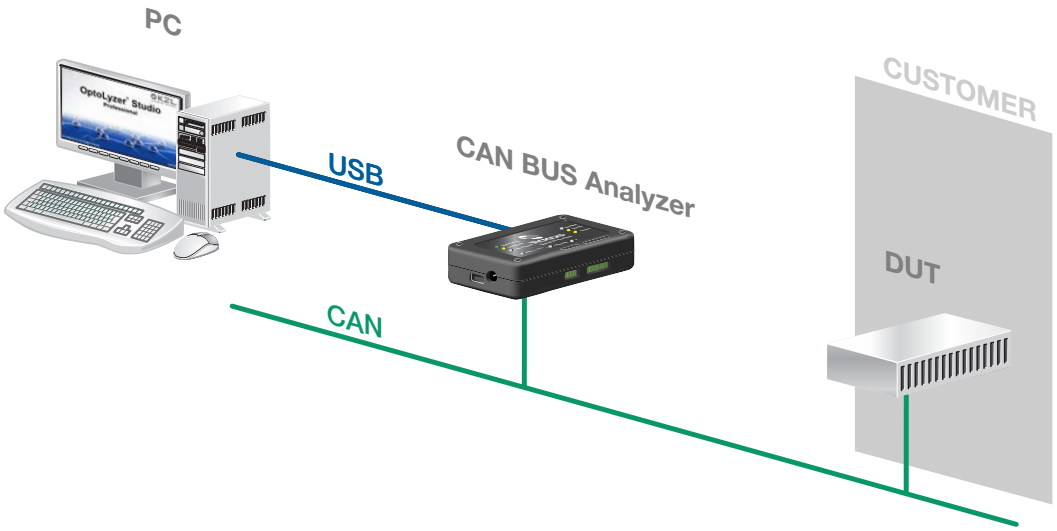

Figure 3.10 Connection Diagram when Used with CAN Bus Analyzer

Follow these steps to connect the OptoLyzer Studio properly when using in combination with a CAN Bus Analyzer.

1. Connect the CAN Bus Analyzer via the delivered USB cable to the PC on which the OptoLyzer Studio is running. The respective USB driver has been installed together with the OptoLyzer Studio. The last version is part of the installation package but can also be downloaded from http://www.microchip.com/. Then follow these steps:
   a. In the **Applications** area search for **CAN** and select it.
   b. Select **Development Tools**.
   c. Search for **CAN Bus Analyzer Tool** and select it.
   d. Download the last software version of the **CAN BUS Analyzer Installer**.
2. Connect the CAN Bus Analyzer to the CAN bus. For details about how to connect the bus systems refer to [2].
3. Connect the DUT to the CAN bus.
4. Power all devices.

The system is ready to be viewed and analyzed.

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Chapter 4 Used Environment and General Hints

4.1 Used Environment for Guided Tours

The following chapter describes some basic steps how to work with the OptoLyzer Studio. To show somehow realistic data an example environment is set up that shows an OptoLyzer MOCCA CLF, a micro controller and an engine. The OptoLyzer MOCCA CLF and the micro controller are connected via a CAN bus system or a LIN bus system. The micro controller controls the speed of the engine, i.e., in the example the engine is running at a constant speed. The OptoLyzer MOCCA CLF itself is connected to a PC via USB cable. OptoLyzer Studio is running on the PC. This example requires the OptoLyzer Studio Foundation CL Edition.

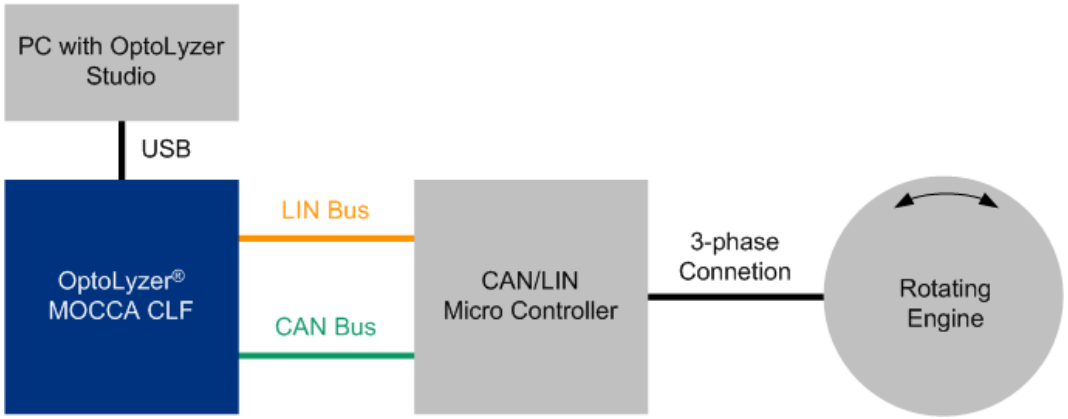

Figure 4.1 Example Environment

4.2 Good to Know Before Starting

1. It is recommended to plug the CmDongle into a USB port of the PC before starting the OptoLyzer Studio.
2. The OptoLyzer Studio offers a combination of a traditional menu bar (menu item **File**) with a ribbon (items **Home**, **View** etc) in addition to a lot of tool windows. Depending on the context the ribbon changes and the items in the **File** menu change their functionality in a context-sensitive manner. For example **Save** (Click **File** | **Save**) can save a workspace, a log file or a filter configuration depending on which window has the focus (in the example either focus on workspace window, on trace window or on filter window).
3. The OptoLyzer Studio provides two types of windows: tool windows and document windows.
   a. Tool windows are child windows which provide a view to an object or an aspect of an object. An object here could be some settings, a workspace item, a configuration, a device state and so on. If tool windows are closed, they are hidden.
   Tool windows are listed in ribbon View. Click on the View button to show or activate a tool window: Workspace, Device Manager, Description, Disassembly, Hex View, Bit View, System Info, Error & Warnings.
   b. Document windows are child windows which provide a view to data (a document), which can be loaded from a file and stored to a file (catalog file, log file, etc.). If document windows are closed without saving, changes are lost. If document windows are deleted (no shortcut available), e.g., in the workspace, they are deleted from the hard disk. If you want to remove a file from the workspace but don't want to lose the data of the file, select **Exclude from Workspace** in the context menu. This item removes the files from the workspace but keeps the files stored on the hard disk.
   Document windows are Catalog, Trace, user defined Filter files or user defined Activity files.
4. The OptoLyzer Studio provides a lot of tool tips. Keep in mind that hovering over an icon or function shows tool tips. They describe the functions in a short manner and help when working with the application.

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Chapter 5 Guided Tour through Trace View - Monitor Messages

The chapter below describes:

- the first steps how to start the OptoLyzer Studio
- how devices are prepared for online monitoring (only first steps)
- the benefit of using a Catalog
- some remarks about the Workspace
- general use of a Trace View

5.1 Start the OptoLyzer Studio for the First Time

Follow the steps below:

1. Click “Start | Programs | K2L | OptoLyzer Studio | OptoLyzer Studio”.

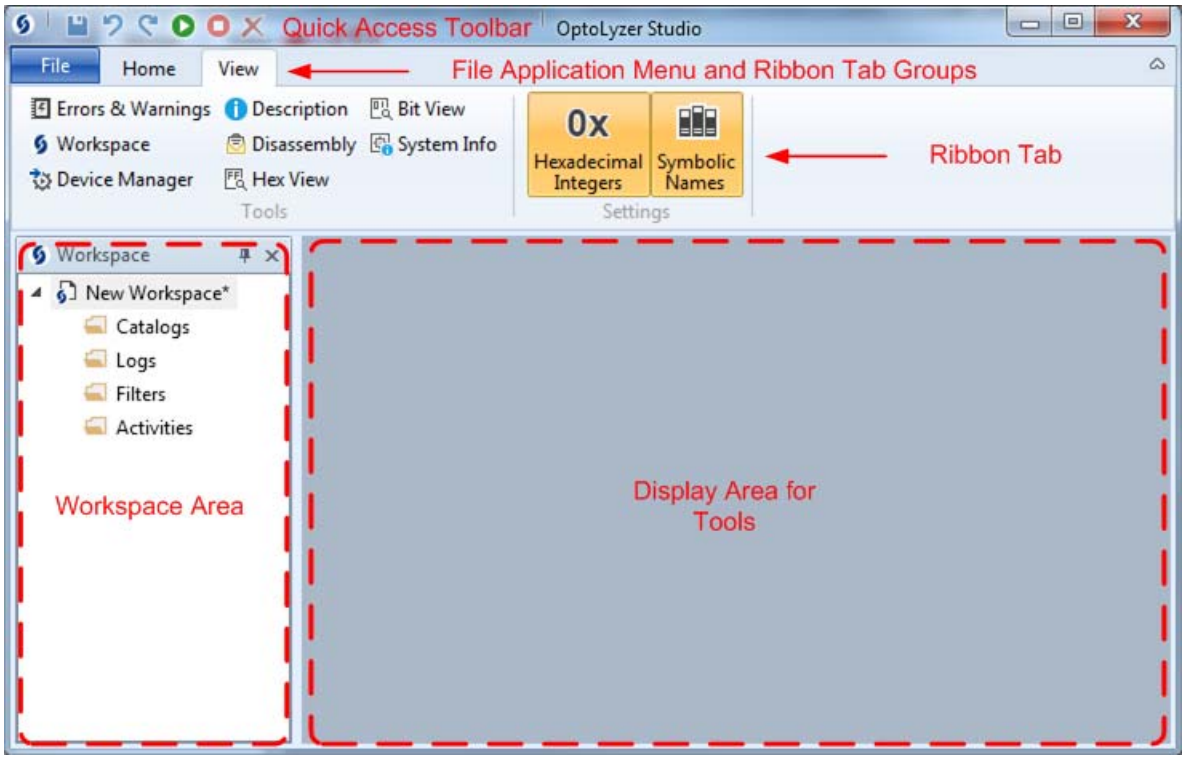

Figure 5.1 OptoLyzer Studio - First Start

The graphical user interface of the OptoLyzer Studio shows the following areas:

- Quick Access Toolbar: For details refer to Section 10.1, "Quick Access Toolbar," on page 100.
- File Application Menu and Ribbon Tab Groups. For details refer to Section 10.2, "File Application Menu and Ribbon Tab Groups," on page 101.
- Ribbon Tabs: The items change according to the selected window (Section 10.2, "File Application Menu and Ribbon Tab Groups," on page 101).
- Workspace: For details refer to Section 10.3, "Workspace," on page 104.
- Display Area for Tools. The Trace View will be opened in this area by default (but can be customized as desired).

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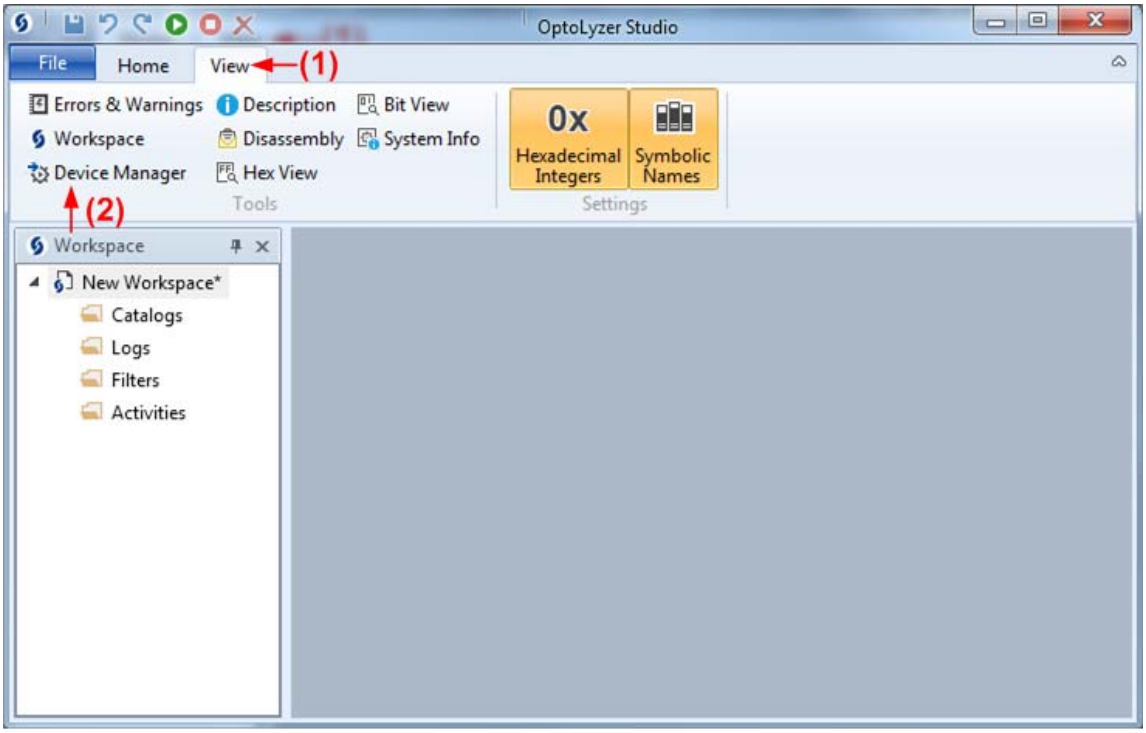

Legend:
(1), (2), … : Numbers specify an action.
(a), (b), … : Characters indicate the place in a figure that refers to a description in the text.

Figure 5.2 Check for Connected Devices

2. Click **View (1)** in the ribbon (Figure 5.2) to check in a next step whether a supported device is connected or not. The View ribbon shows all tools that are provided within the OptoLyzer Studio.
3. Click **Device Manager (2)**.

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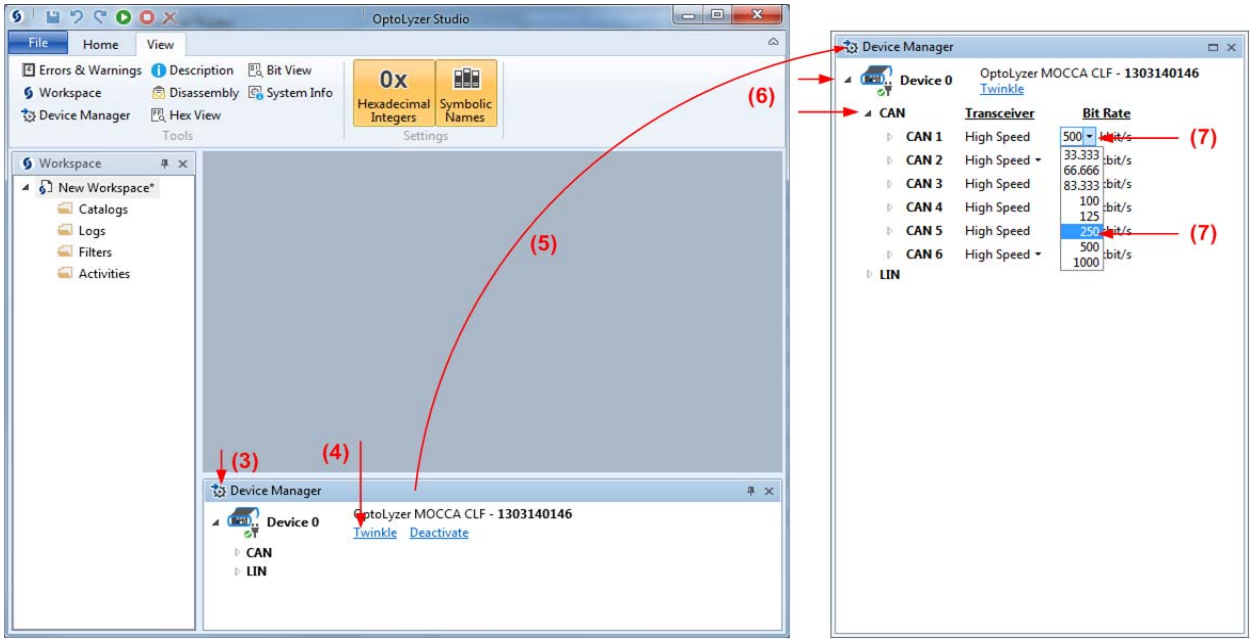

Figure 5.3 View Connected Devices in Device Manager

A window opens (Figure 5.3) that is the central point for the configuration of the connected devices (different icons for connected devices and disconnected devices) inclusive the properties of the bus systems which can be accessed by those devices **(3)**. The name and the type of the device is shown (and can be changed if desired: just insert the new name behind the device icon and click Enter). In our example an OptoLyzer MOCCA CLF is connected. If several devices are connected, each of them will be shown in a separate branch. Each channel of a device is presented in its specific branch.

4. Click **Twinkle (4)** to be sure the proper device is shown. The Active LED of the OptoLyzer MOCCA CLF twinkles.
5. Drag and drop the window **(5)** and enlarge the window.
6. Click the small triangles **(6)** in front of the device and the CAN bus system to view the details. In our example environment the **Bit Rate** of **CAN 1** has to be adjusted as the test environment is using a bit rate of 250 kbit/s on channel 1 that is different from the default value (500 kbit/s). Therefore click the **Bit Rate** drop-down box of **CAN 1 (7)** and select the bit rate as desired (**250 kbit/s**).
7. Close **Device Manager**, i.e., click the **Close** button. (This step is optional just to keep the focus on the next step.)

Figure 5.4 Start Online Monitoring

8. Switch back to **Home** and click **Start (8)**, or simply press the **F5** key. This starts online monitoring of the traffic transmitted over the bus systems that are supported by the connected devices.

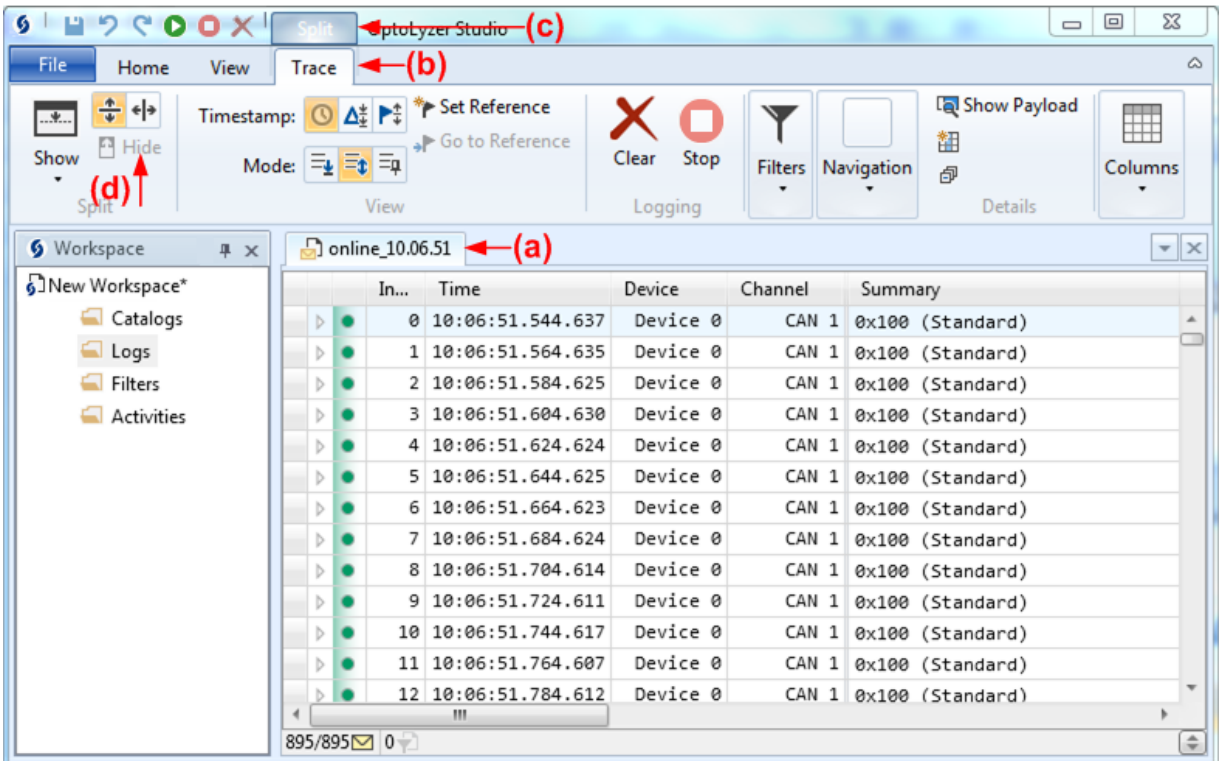

Figure 5.5 Online Monitoring

The monitored messages are shown in a Trace View **(a)** (Figure 5.5). The name of the Trace View starts with ‘online’ and is extended by the time stamp that states the start of the online monitoring. The Trace View presents the messages in a table whereby one row represents one message. The columns represent the message properties. The title of the column is similar to the name of the message property. A column is assigned to exactly one property of a single message type. If a message type does not support a column, the cell of the column of that message row remains empty. The user can select a message. A selected message is highlighted. Other tools are able to retrieve the selected message, for example to display details of that message (Section 9.1, "Disassembly," on page 90).

Together with the Trace View the **Trace** ribbon **(b)** is shown. This ribbon is an additional ribbon that is also indicated as **Split** window **(c)** in the title bar. The ribbon tab provides access to all functions that are available for the Trace View. Important functions will be touched within this tour below. A Split window indicates that the log file can be split, e.g., either vertical or horizontal **(d)**, i.e., two windows show data both referring to the same source. Other split functions will be handled later on (Section 7.1, "Start Graph," on page 57).

In a next step (before focusing on the Trace View) a Catalog is loaded. A **Catalog** helps interpreting the data in a Trace View. **Catalog** files have to be created externally. Some details are mentioned in Section 10.3.1, "Catalogs," on page 104.

Notes: It is not a must to add a Catalog but helps presenting data in a user-friendly way.

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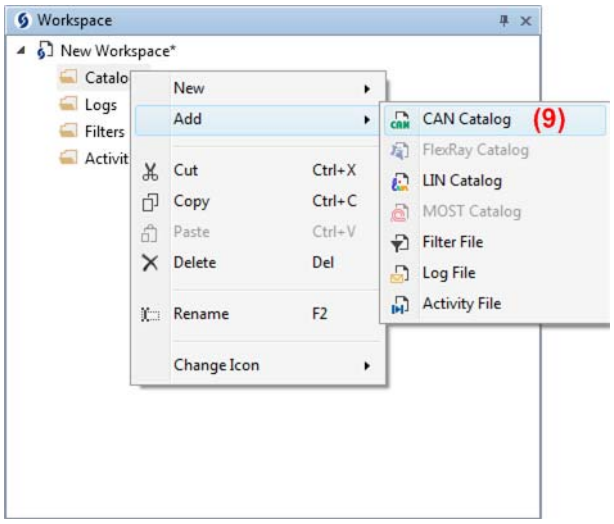

Figure 5.6 Load CAN Catalog

9. In the **Workspace** window select **Catalog (9)**, right-click to open the context menu, select **Add** and then select **CAN Catalog**. A dialog box opens.

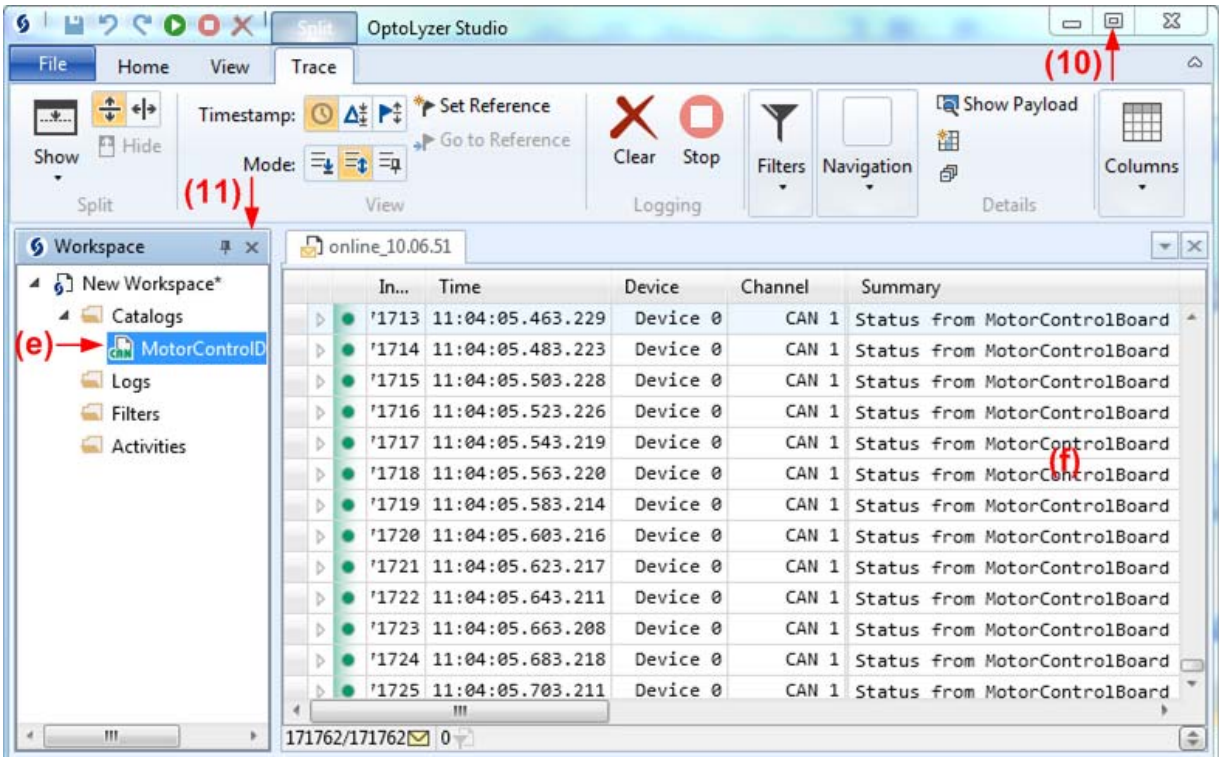

Figure 5.7 Online Monitoring after Loading a Catalog

10. Navigate to the location where the Catalog you want to use is stored. Catalogs can have file extension *.dbc or *.xml. Select the **CAN Catalog** of interest and click **Open** in the dialog box. The Catalog is stored in the folder **Catalog (e)**. In this example a Catalog file 'MotorControlDemo.dbc' is loaded. It has been created for the example environment and has to be replaced by a customer file matching to their needs. As soon as the Catalog is loaded parts of data is interpreted as specified in the Catalog. Figure 5.7 shows an example in column **Summary (f)**. Have a look on the column in Figure 5.5 and Figure 5.7.

11. To focus on the Trace View perform the following two optional steps: Click the **Maximize** button **(10)** in the OptoLyzer Studio and the **Close** button **(11)** in the **Workspace** tool. As mentioned before the **Workspace** can be reopened in the **View** ribbon without losing information.

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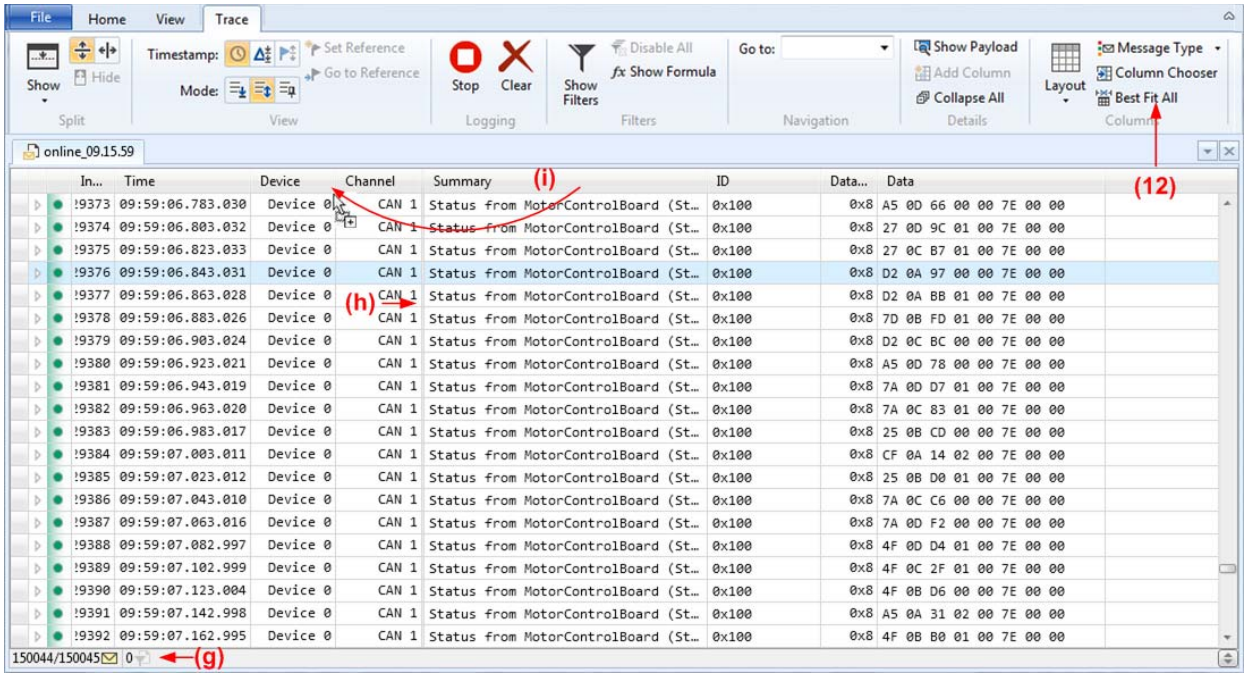

Figure 5.8 Focusing on Trace View

The Trace View displays messages, the status bar **(g)** shows how many messages are shown. The first value counts the filtered messages, the second value shows the total message count. Because of filters there might be a discrepancy. In the example above (Figure 5.8) there are no filters active (last number combined with disabled filter symbol).

When a Trace View is opened a default layout is used. This default layout covers specific properties that are matching to all supported bus systems although the property names may differ slightly among the bus systems. The most important properties are arranged to the left of a **fixed style operator (h)**, others to the right. The fixed style operator is indicated by a broader strip compared to other property borders. Columns to the left of it will not be scrolled horizontally (default setting). Properties of interest can be moved (just drag the respective header of the column and move it to the place you want **(i)**) to the left of the fixed style operator. This helps keeping the focus on details while scrolling other values horizontally.

12. To optimize the presentation of data content, header and column width click **Best Fit All (12)**.

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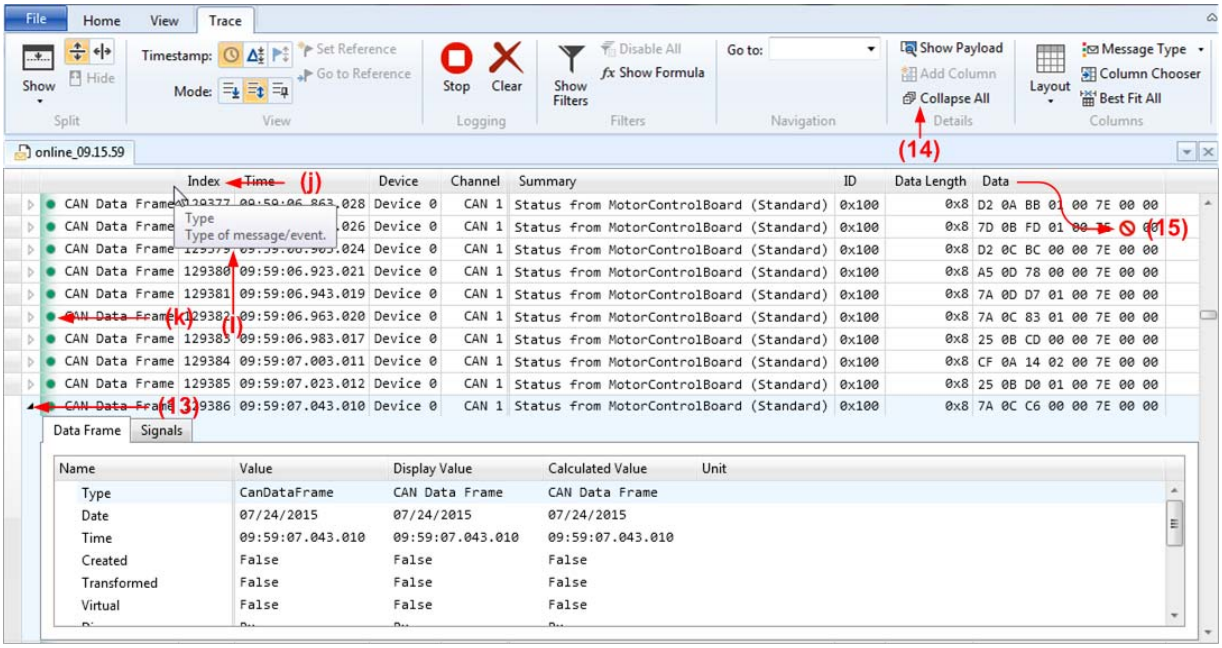

Figure 5.9 Focusing on Trace View Content

The Trace View shows all messages of all connected devices and supported bus systems. An index field **(j)** identifies a message and shows its position within the Trace View. A message has always the same index. If some messages do not meet filtering criteria, then there will be gaps in Index column values.

Notes: If Filters are activated, it might be messages are blocked and thus there might be gaps in the order of index values.

To help identifying the messages each message type has its own color code **(k)**. Hover over the column headings **(l)** to view the tool tips for the properties.

13. Click the small triangle **(13)** in front of a message to expand a Detail View. This Detail View contains tabs to access the properties that are displayed as a list. The **Data Frame** tab shows all properties of a message that can be interpreted without a Catalog or if the message cannot be assigned to a Catalog entry. The **Signal** tab shows the data part interpreted by a Catalog. If the Catalog is missing a **Body** tab provides the raw data as is, i.e., without any interpretation (Figure 5.10). All properties in the tabs are displayed in three content variants:

Table 5.1 Value Variants

Value Variant	Description
Value	This raw value is transmitted over the bus system.
Display Value	This value is able to present the value in a user-friendly way as it uses both the **Hexadecimal Integers** settings and the **Symbolic Names** settings that are provided in the Catalog. Refer to the **View** ribbon and click the toggle buttons **Hexadecimal Integers** and **Symbolic Names** as desired (shown in Figure 5.3).
Calculated Value	This value is calculated according to meta information in Catalogs.

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A unit is presented if it is available for the value. A Detail View can be opened for each arbitrary message, i.e., more than one Detail View can be displayed in a Trace View. Thus it is easy to compare the values of messages.

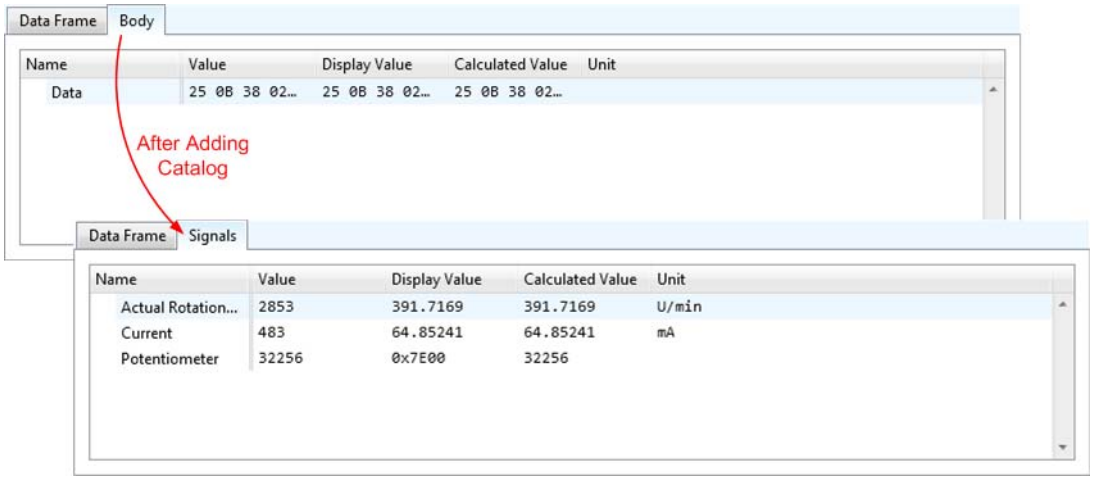

Figure 5.10 Detail View Body and Signal

14. A ribbon entry allows the user to close all Detail Views with a single click. Refer to the **Trace** ribbon and click **Collapse All** as shown in Figure 5.9 **(14)**.

In the next steps the content within the Trace View will be modified (i.e., properties will be hidden and added).

15. Select the **Data** property and drag the column down into the window as shown in Figure 5.9 **(15)** and drop it. The column is hidden.

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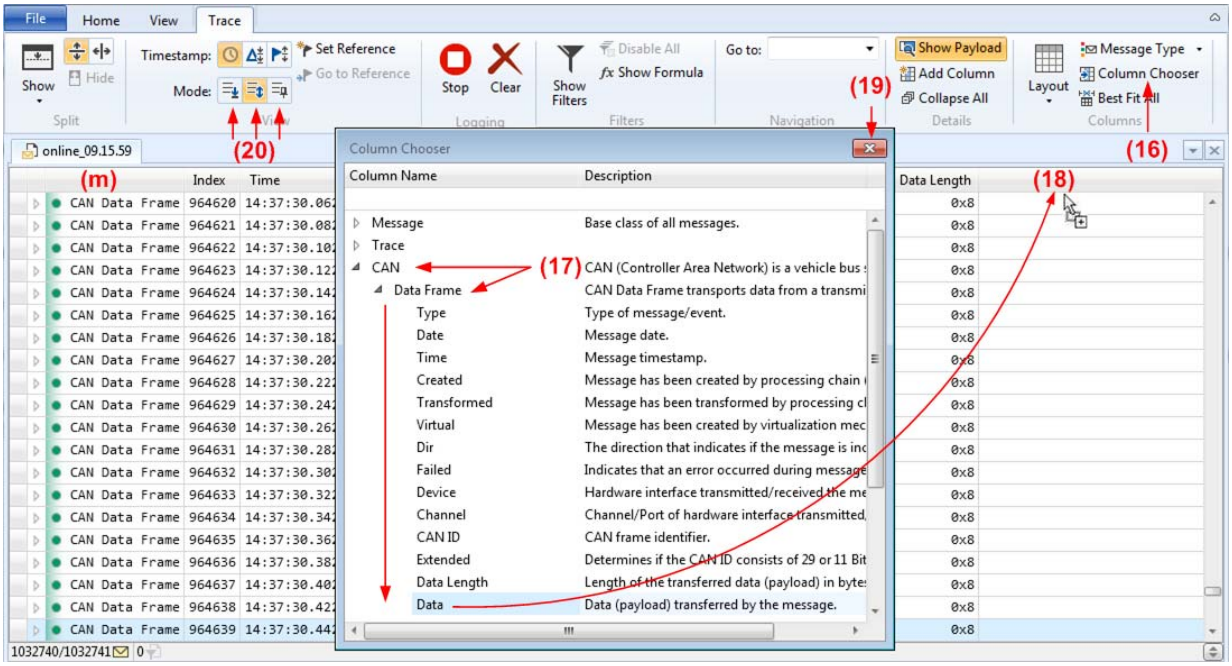

Figure 5.11 Adding Columns

16. To add a property (e.g., the hidden **Data** property in this example) click **Column Chooser (16)**. The **Column Chooser** opens. Click onto the small triangle in front of **CAN** and then click the triangle in front of **Data Frame** (why Data Frame: because Data is a property of a CAN Data Frame refer to **(m)** in Figure 5.11) and scroll down till **Data** is displayed **(17)**. Drag & drop **Data** into the header of the Trace View window **(18)**. Click **Close (19)** to close the **Column Chooser**. Each property of a supported message can be added in the same way.

17. Hover over the Mode buttons **(20)** to view the tool tips, then click the **Auto Scroll** button in Figure 5.11, view the incoming messages and how they scroll through the window. Afterwards click the **Fixed Position Trace** button **(20)**.

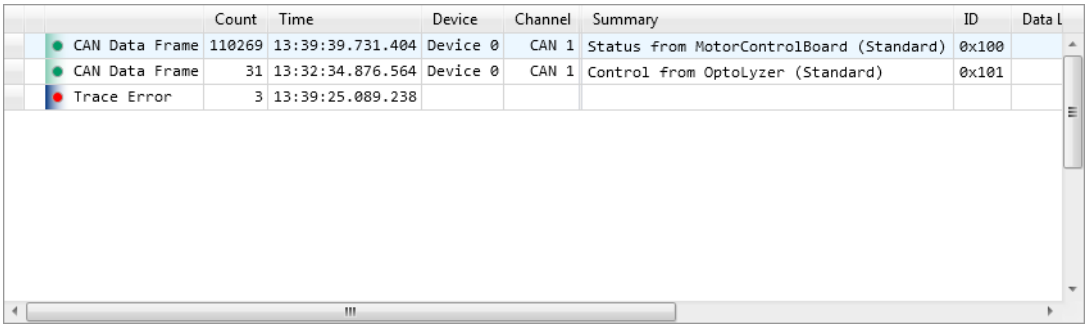
Count
Time
Device
Channel
Summary
ID
Data L
CAN Data Frame 110269 13:39:39.731.404 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 31 13:32:34.876.564 Device 0 CAN 1 Control from OptoLyzer (Standard) 0x101
Trace Error 3 13:39:25.089.238

Figure 5.12 Example of a Fixed Position Trace View

The **Fixed Position Trace** shows the last message for each group (refer to Table 5.2) that has been received by the OptoLyzer Studio. In the example below (Figure 5.12) there are three different messages recognized. The two CAN Data Frame message types differ in their IDs and therefore two lines are added. The amount of the different messages is counted and shown for each group.

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Viewing is possible in three modes:

Table 5.2 Available Modes

Mode	Icon	Description
Auto Scroll		All incoming messages are displayed at the bottom of the Trace View. As much messages as possible are shown in the Trace View. The amount of messages that are currently visible depends on the size of the window. There is no vertical scroll bar. This mode is only available in online viewing mode, i.e., if **Start** is clicked in the **Home** ribbon. This mode can be selected to check whether new messages are incoming or not. Auto Scroll is set by default if messages are online received.
Normal Scroll (Default)		All incoming messages are attached at the end of the log file that is at the bottom of the window. There is a vertical scroll bar. This mode is set by default, if log files are viewed offline. It can be used to view messages in detail (values, data and time stamp comparison).
Fixed Position Trace		A Trace View can be set to Fixed Position mode. In this mode, incoming messages are not automatically entered at the bottom of the trace list. If there is already a line in the Trace View with a message of the same group (i.e., for each message type and different IDs) the content of that line will be updated with the properties of the latest message. If such a line does not exist already, a new line is added to the Trace View (if the filter settings allow this). This mode is available in online and offline mode. Messages belong to the same group if: ■ They are received on the same channel (implying also on the same device). ■ They belong to the same message type. ■ CAN: They have the same CAN ID. They have the same value of the Extended flag (11 bit/29 bit identifier). ■ LIN: They have the same ID.

18. To explain the different time stamp functions click the **Normal Scroll** button **(20)** in Figure 5.11. By default the **Absolute time stamp** is set, i.e., is showing absolute values for the time for each message. In the following windows the Workspace window has been opened again. It will be used when the log file is stored and assigned to the workspace. This can be done by selecting the **View** ribbon and clicking **Workspace**. Then switch back to the **Trace** ribbon.

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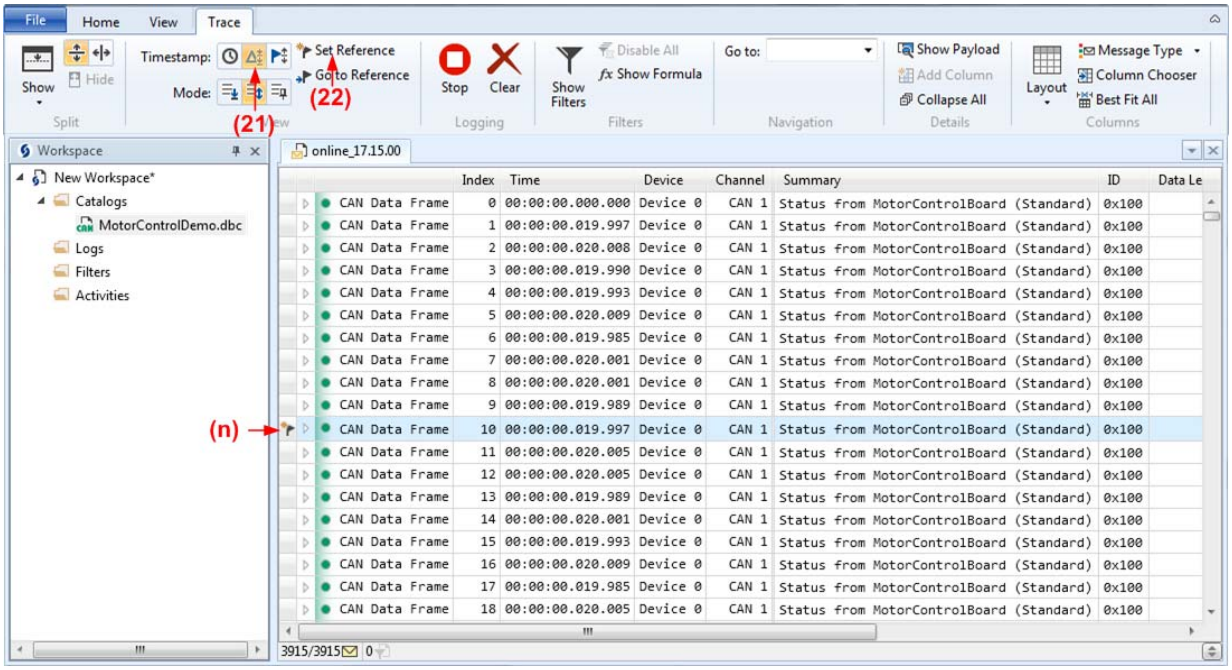
File
Home
View
Trace
Show
Hide
Split
Timestamp:
Mode:
Set Reference
Go to Reference
(21)
(22)
Stop
Clear
Logging
Show Filters
Disable All
Show Formula
Filters
Go to:
Navigation
Show Payload
Add Column
Collapse All
Details
Layout
Message Type
Column Chooser
Best Fit All
Columns
Workspace
New Workspace*
Catalogs
MotorControlDemo.dbc
Logs
Filters
Activities
online_17.15.00
(n)
Index Time Device Channel Summary ID Data Le
CAN Data Frame 0 00:00:00.000.000 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 1 00:00:00.019.997 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 2 00:00:00.020.008 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 3 00:00:00.019.990 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 4 00:00:00.019.993 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 5 00:00:00.020.009 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 6 00:00:00.019.985 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 7 00:00:00.020.001 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 8 00:00:00.020.001 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 9 00:00:00.019.989 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 10 00:00:00.019.997 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 11 00:00:00.020.005 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 12 00:00:00.020.005 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 13 00:00:00.019.989 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 14 00:00:00.020.001 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 15 00:00:00.019.993 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 16 00:00:00.020.009 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 17 00:00:00.019.985 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
CAN Data Frame 18 00:00:00.020.005 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100
3915/3915 0

Figure 5.13 Using Time Stamp Functions 1

19. Click **Difference time stamp (21)** (Figure 5.13) to view the time intervals between the single messages. Use this mode, e.g., to estimate how long a message sequence takes to complete and for general comparison purposes if you want to have the first message as reference in the trace view.

20. Select a message in the trace view (the selected message is highlighted) and click the **Set Reference** button **(22)**. The selected message is set as a reference. A small reference icon is added in front of the message in the trace view **(n)**.

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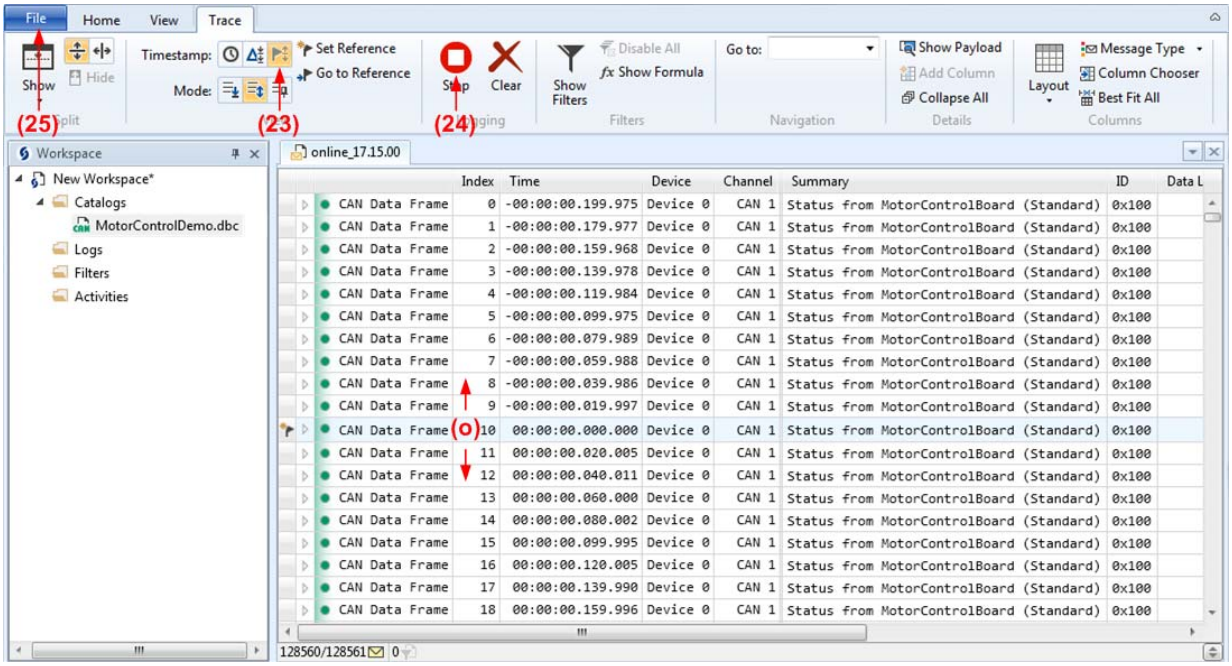

Figure 5.14 Using Time Stamp Functions 2

21. Then click the **Relative time stamp (23)** (Figure 5.14) to show the time intervals to prior and following messages **(o)**. Use this mode, e.g., to estimate how long it takes to reply to a message and for general comparison purposes if you want to have the selected message as reference. To change the reference just select another message and then click the **Set Reference** button.

The table below provides a short overview about the different modes.

Table 5.3 Available Modes

Time Stamp Mode	Icon	Description
Absolute		The time is displayed as absolute value (13:50:45.015.350).
Difference		The displayed value represents the time interval between the reception of the previous visible message and the current one (00:00:00.000.476). The first message has the value 00:00:00.000.000.
Relative		The displayed value represents the time interval between the reception of the current message and a reference message (00:00:00.000.476). The reference message has the value 00:00:00.000.000. Older messages than the reference messages have negative values.

As last step the log file is stored in a workspace.

22. As long as online data is received a log file cannot be stored. Therefore click **Stop (24)** in the **Trace** ribbon. This stops online viewing. To don't lose the content of the trace view click **File (25)** in the Application menu and select **Save As**. A dialog window opens. Specify the name of the file and the location as desired. Alternatively use the suggested default name that starts with 'online' and is extended by the time indicating the start of the online viewing. File extension will be *.olslog. Click **Save** in the dialog box.

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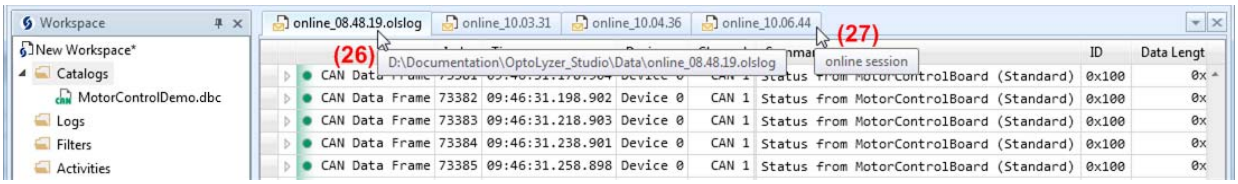

Figure 5.15 Example of a Stored and not Stored Online Trace

The name of the file inclusive its extension will be shown in the Trace View tab **(26)**. The extension is missing in online Trace Views that are not stored. Hover over other online files **(27)**.

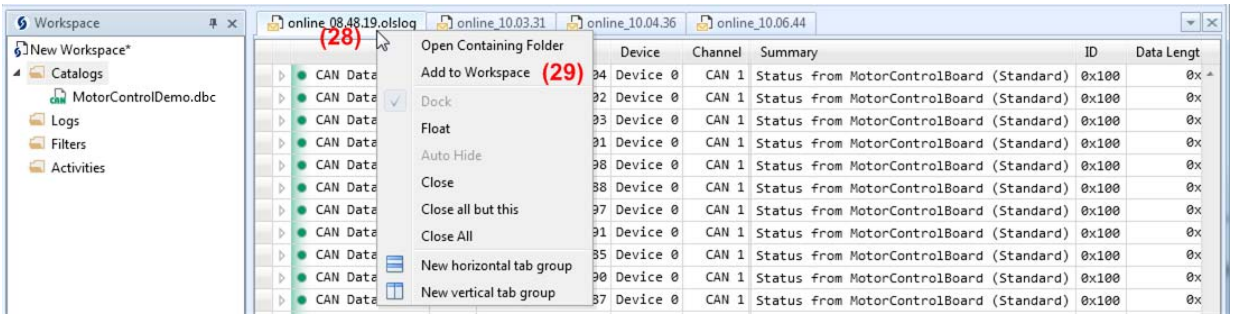

Figure 5.16 Assign Log File to Workspace

23. As soon as a log file is stored it can be assigned to a Workspace. The Workspace is the place where all data is stored that refers to it. Hover the mouse over the caption of the stored trace **(28)** and right-click to open the context menu. Select **Add to Workspace (29)** (Figure 5.16).

The log file is assigned to the Workspace but not to **Logs** (i.e., a folder that can be seen as an administrative structure to organize the log files belonging to a Workspace).

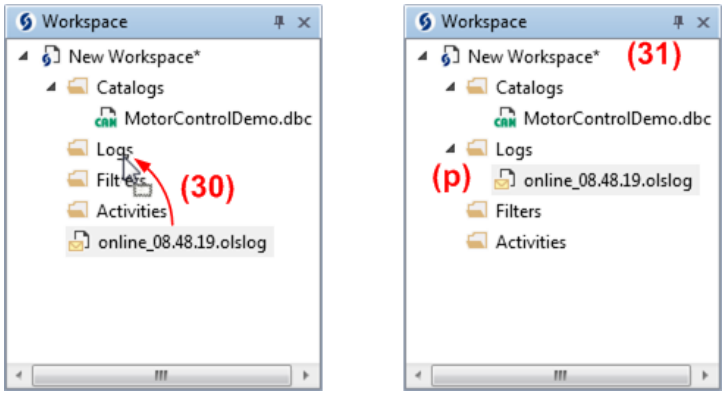

Figure 5.17 Drag and Drop Log File within Workspace

24. Select the log file and drag it to **Logs (30)** and drop it **(p)**. Till now **New Workspace** is not stored indicated by an asterisk.

25. Select **New Workspace* (31)** and click **File** in the application menu and **Save Workspace As**.

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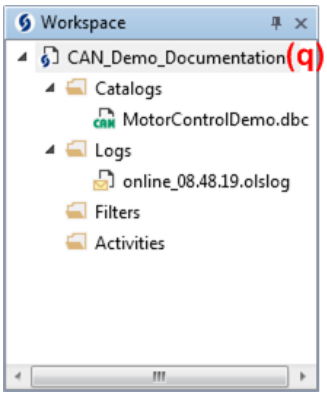

Figure 5.18 Stored Workspace

26. A dialog window opens. Specify the name of the workspace and the location as desired, e.g., in the example **CAN_Demo_Documentation (q)**. The Workspace will be stored with file extension *.olsworkspace.
27. Close OptoLyzer Studio.

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Chapter 6 Guided Tour through Activity - Send a Message

The OptoLyzer Studio supports generation of messages and is able to send messages to the bus systems. This functionality is provided in the tool **Activity**. This chapter describes how 'to program' a small sample that supports both generation and sending of messages. The sample below is using the same example environment as described in Figure 4.1 Example Environment on page 21, i.e., an OptoLyzer MOCCA device has to be connected.

6.1 Start Activity Tool

1. Start OptoLyzer Studio.

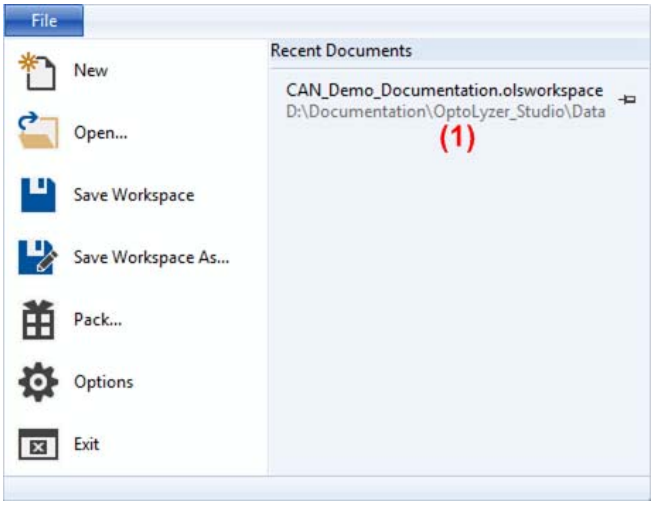

Figure 6.1 Load Workspace from Recent List

2. Click **File** (1) in the application menu (Figure 6.1) and select the workspace from the **Recent Documents** list **CAN_Demo_Documentation** that has been created in Chapter 5. If a dialog box opens where you are asked whether you want to save a workspace or not, decide as desired. The selected workspace is loaded inclusive the respective Catalog and the saved log file.

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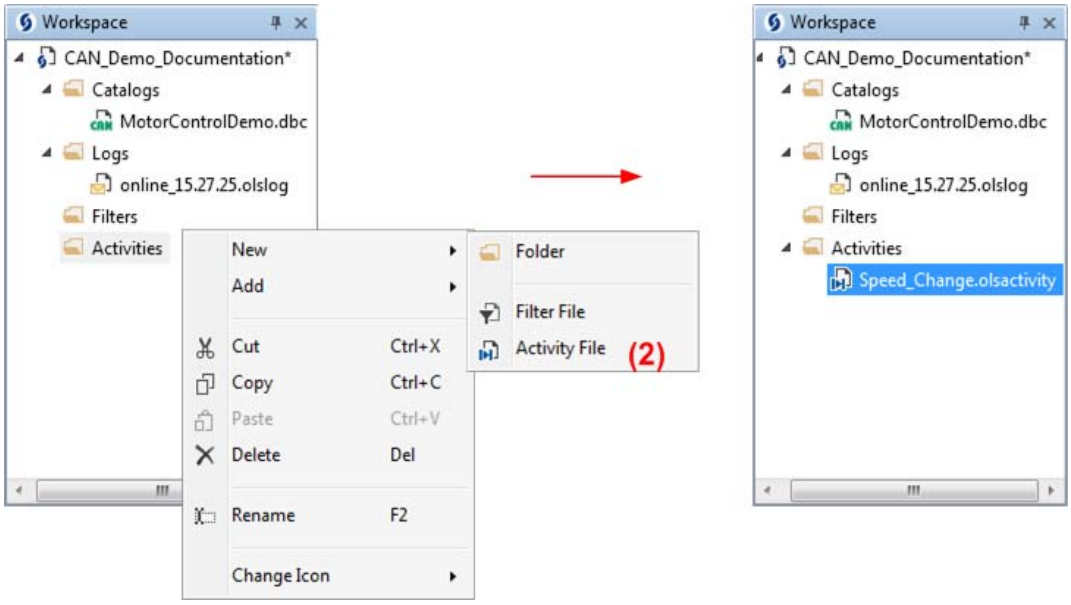

Figure 6.2 Create an Activity

3. In the workspace window select **Activities**, right-click, select **New** and **Activity File (2)**. A dialog box opens where you have to specify name and path of the new Activity. In this example the file name '**Speed_Change**' is specified. Default file extension will be *.olsactivity. Finally click **Save** in the dialog box. An activity file **Speed_Change.olsactivity** is added in the folder **Activities** (Figure 6.2).

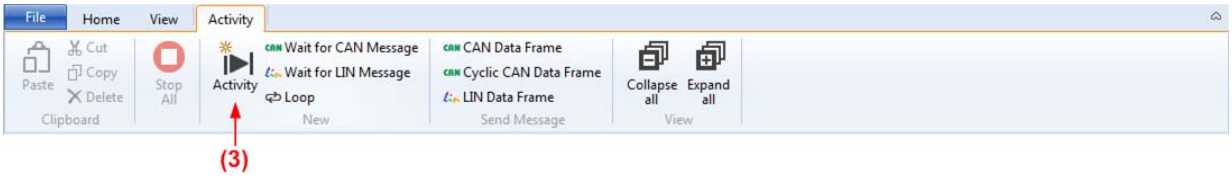

Figure 6.3 Activity Ribbon - Add Empty Activity

Together with an empty **Activity** window the **Activity** ribbon is shown. This ribbon is an additional ribbon, i.e., it is only shown if the Activity window has the focus. The ribbon tab provides access to all functions that are available for the Activity. Important functions will be touched within this tour below, others are described in Section 10.3.5, "Activities," on page 107.

The target for the next steps will be to add a sequence of messages in which first the speed of the engine will be accelerated (Figure 4.1 on page 21), then this speed is kept for a while and then the speed is reduced. This sequence shall be embedded in a loop.

OptoLyzer Studio provides several methods to approach this target. There are predefined functions ready to be used partly already including the loop functionality. However, the first steps will be done from scratch to show how to work inside Activity tool, later on predefined functions will be added.

4. Click **Activity (3)** in the **Activity** ribbon.

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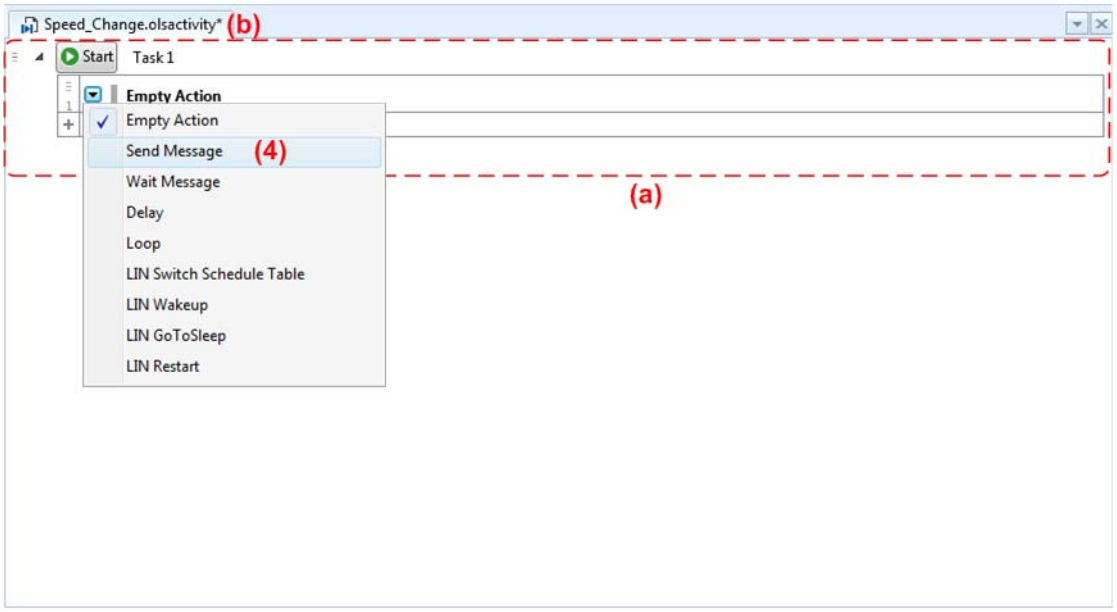

Figure 6.4 Activity - Select Send Message

5. A document template is added. The template shows some elements that are called in its entirety **Activity (a)**. An **asterisk (b)** indicates a changed Activity file and that its current content is not stored. To get a proper message the elements functioning as placeholders have to be customized. In a first step the device that sends a message and the message type itself have to be specified. Therefore click the **triangle** in front of **Empty Action**.
6. Select **Send Message (4)**.

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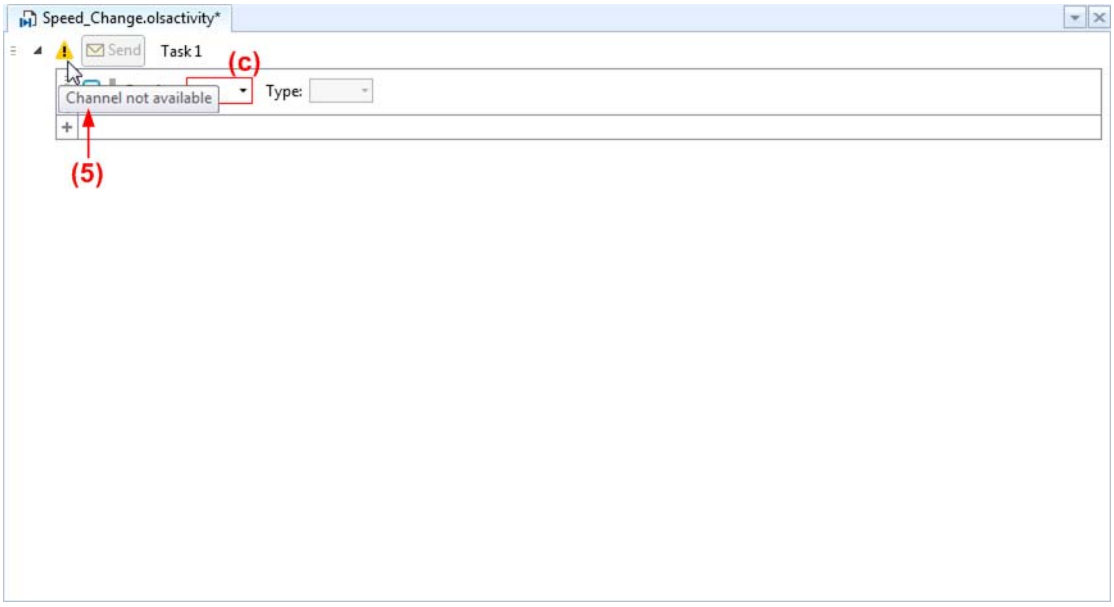

Figure 6.5 Activity - View Tool Tip

7. The elements in the document change. A **yellow exclamation mark** indicates that there is something missing or wrong. Hover over the icon to view the **tool tip (5)**. The tool tip mentions that no channel, i.e., no device is specified right now. The **red rectangle (c)** indicates the place where information is missing.

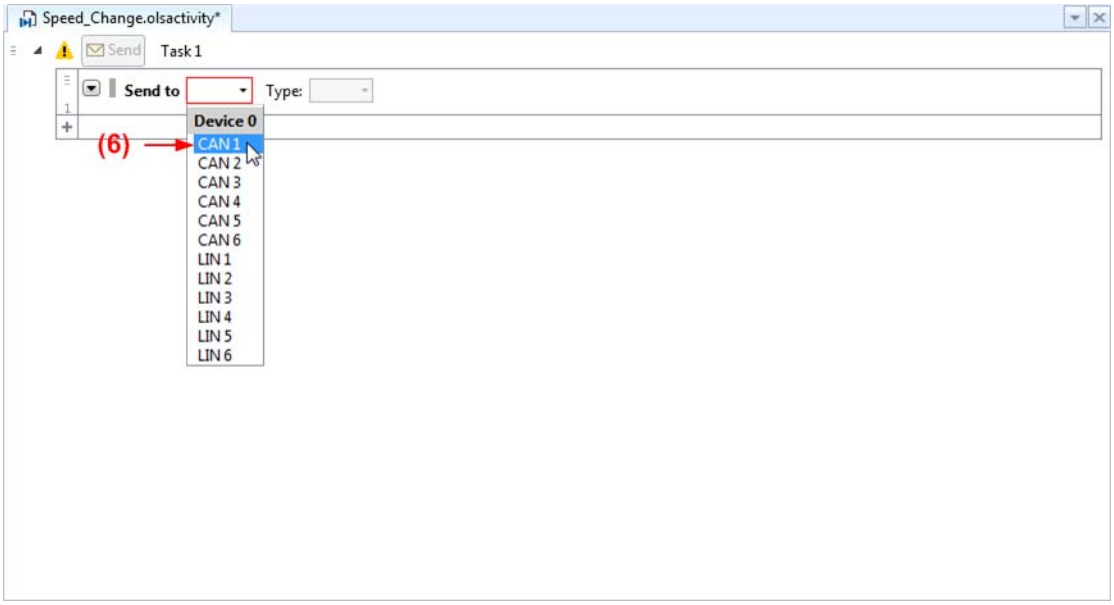

Figure 6.6 Activity - Select Device and Channel

8. Click the drop-down box **(6)** in the **red rectangle** to select the device and the channel which shall be used. In our example **Device 0** and **Channel 1** are selected that has been identified in Figure 5.3 View Connected Devices in Device Manager on page 25.

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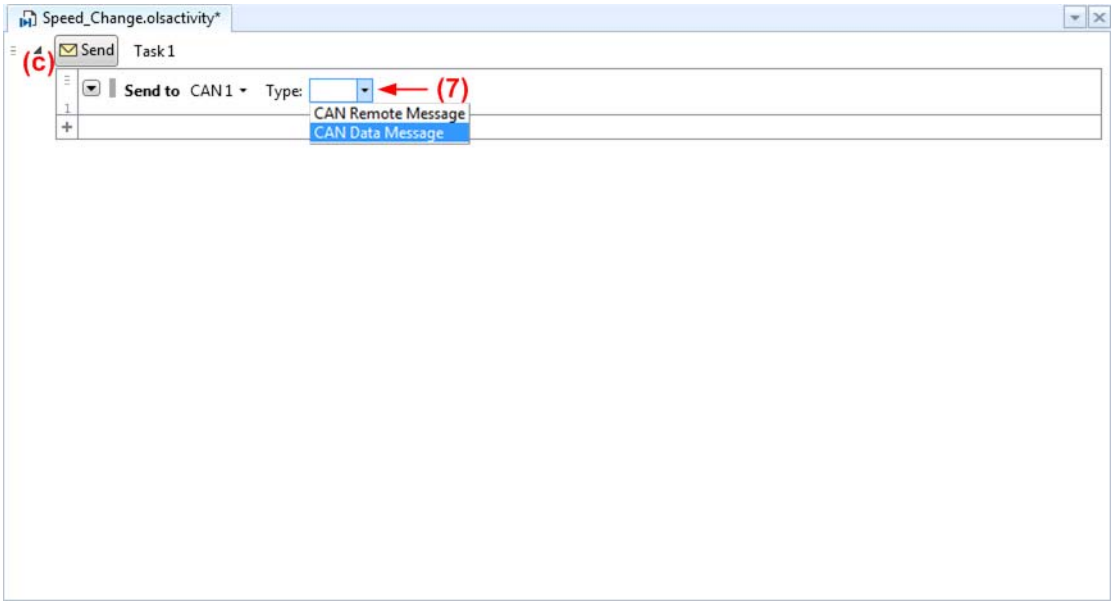

Figure 6.7 Activity - Specify Message Type

9. Immediately after selecting device and channel, the **Send** button **(c)** will be enabled. Now the message type has to be specified. Click the triangle behind **Type** to open the drop-down box and select **CAN Data Message** **(7)** in our example as the data shall be sent without a specific request.

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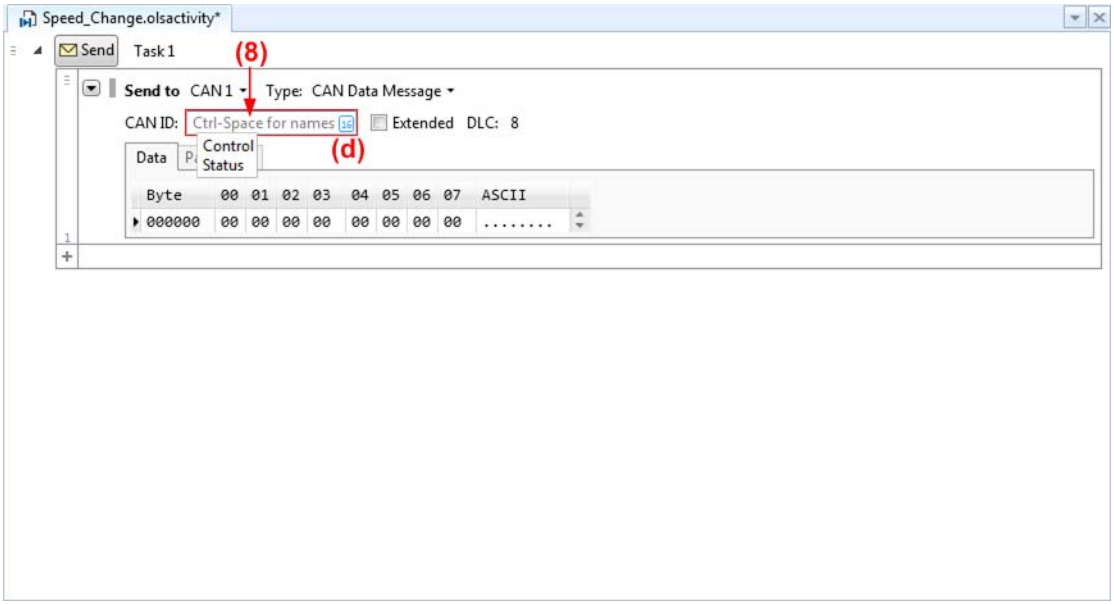

Figure 6.8 Activity - Specify CAN ID

The basic elements of a CAN Data Frame are inserted by default.

A **red rectangle** shows that information is still missing: The **CAN ID**, i.e., do we want to use a Control or a Status message has to be specified.

10. Click **Ctrl + Space** to get a proposal list **(8)**. The proposal list including Control and Status information base on the definitions done in the Catalog. (If no Catalog is loaded, there is no proposal list. Then just type in values that make sense.) Click the **Cursor key down** and select **Control**. Press **Enter** (Alternatively double-click the selection)**.**

Notes: General procedure when adding the CAN ID (keep in mind that the frame properties are specified in the Catalog): Concatenated CAN IDs are completed in the same way as it is well-known from other modern programming languages (as e.g., the context aware code completion in Visual Studio) and is known as IntelliSense.
The number 16 highlighted in blue **(d)** indicates that numbers are interpreted as hexadecimal numbers when inserted manually (Figure 5.3 View Connected Devices in Device Manager on page 25).

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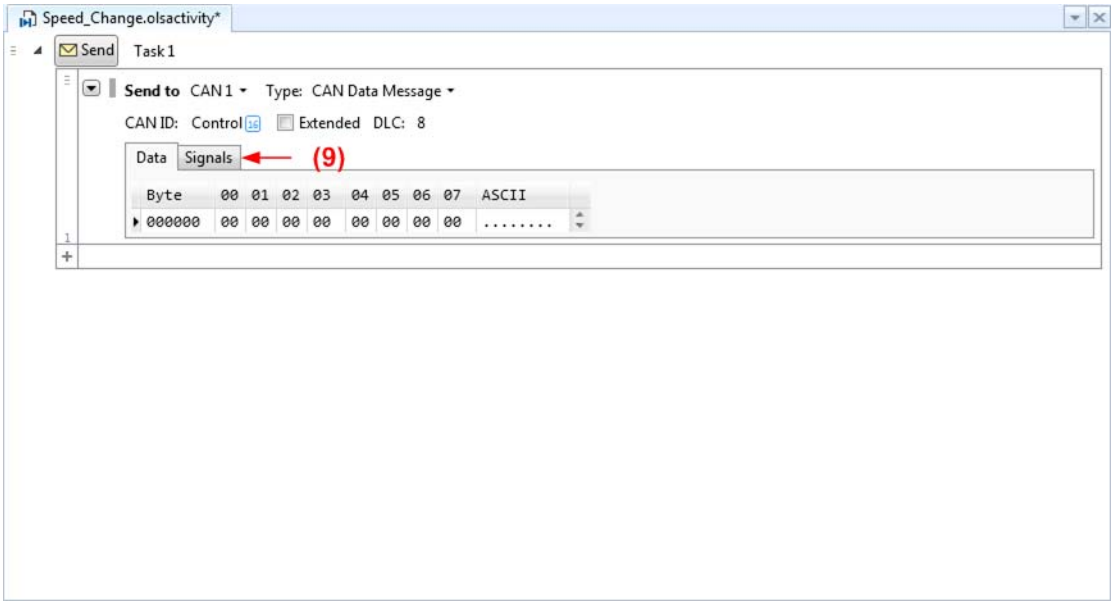

Figure 6.9 Activity - Switch to Signal Tab

11. The message is completed. In a next step details of the CAN Data Frame can be specified that shall be changed and send to the engine. Therefore switch to the **Signal** tab **(9)**.

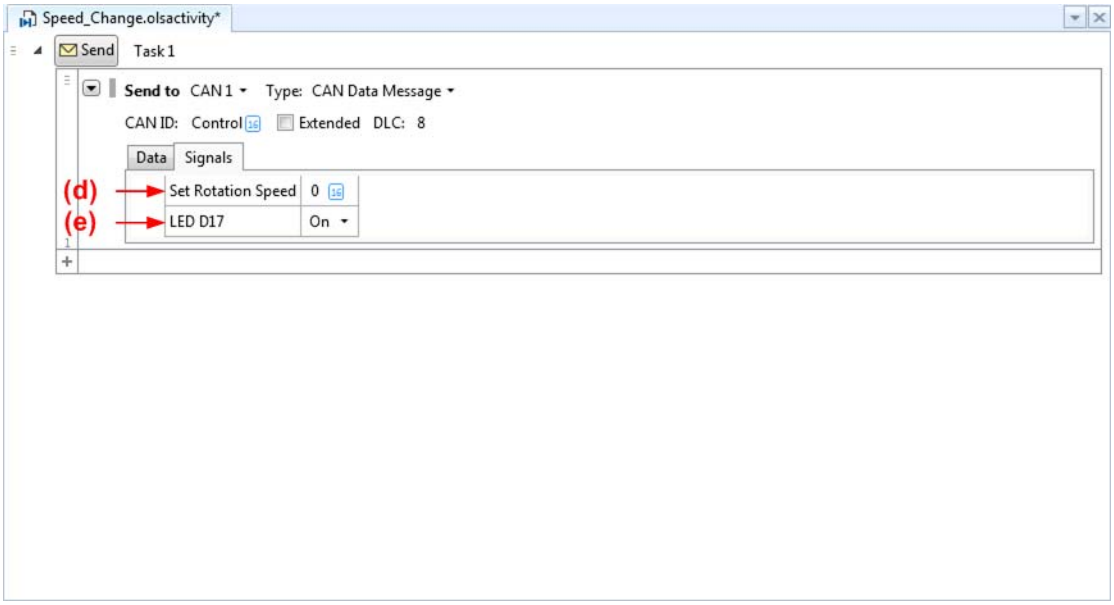

Figure 6.10 Activity - Signal Tab

The signal tab shows specific data of a message. The data is interpreted and presented as signals according to the specification in the Catalog **MotorControlDemo.dbc**. In this example the send message includes two signals. The first signal **Set Rotation Speed (d)** controls the speed of the engine. The second signal **LED D17 (e)** controls a LED on the CAN/LIN micro controller (Figure 4.1 Example Environment on page 21).

Figure 6.11 Activity - Specify Speed

12. Click into the input field and enter a speed, e.g., **5150 (10)** in the example to change the rotation speed of the engine. The number icon **(f)** to the right of the input field is showing **16** meaning that manually inserted numbers are interpreted as hexadecimal numbers. Let the other parameters (**Extended** and **DLC**) and signal **LED D17** unchanged.

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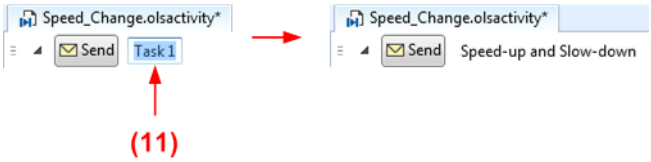

Figure 6.12 Activity - Specify the Name of an Activity

13. The next step describes how to add a user friendly name for the activity. Click into the input field to the right of **Send** **(11)**, mark **Task1** and enter **Speed-up and Slow-down**.

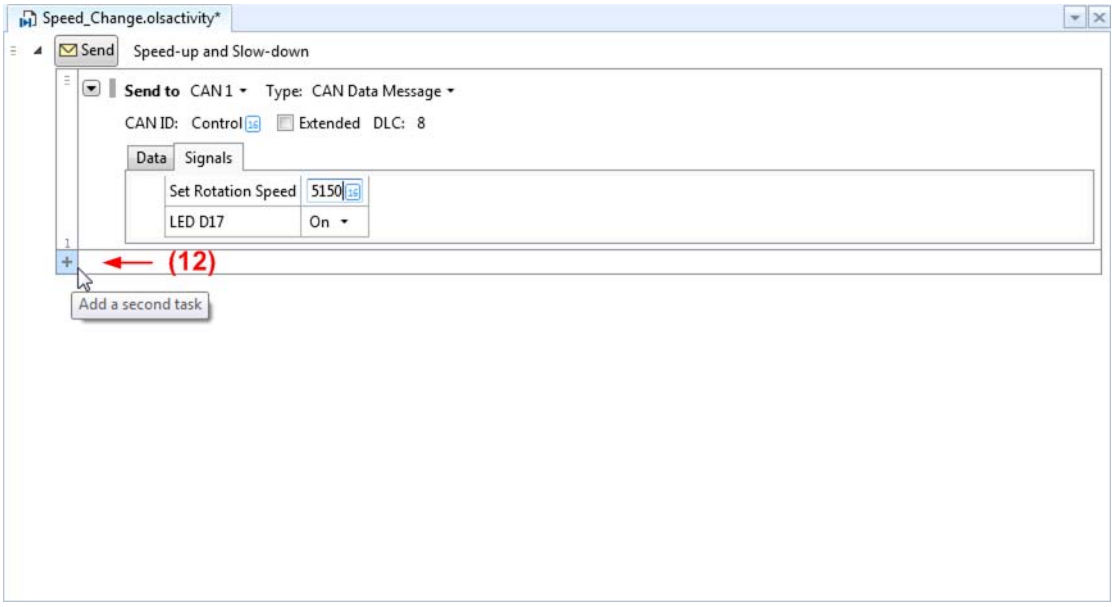

Figure 6.13 Activity - Insert a Delay Step 1

14. In a next step a delay is added to the Activity that helps to visually follow the entire Activity procedure when it is started. Click the **plus** sign as shown above **(12)**. This adds a second task as **Empty Action**. This task can be specified as a delay.

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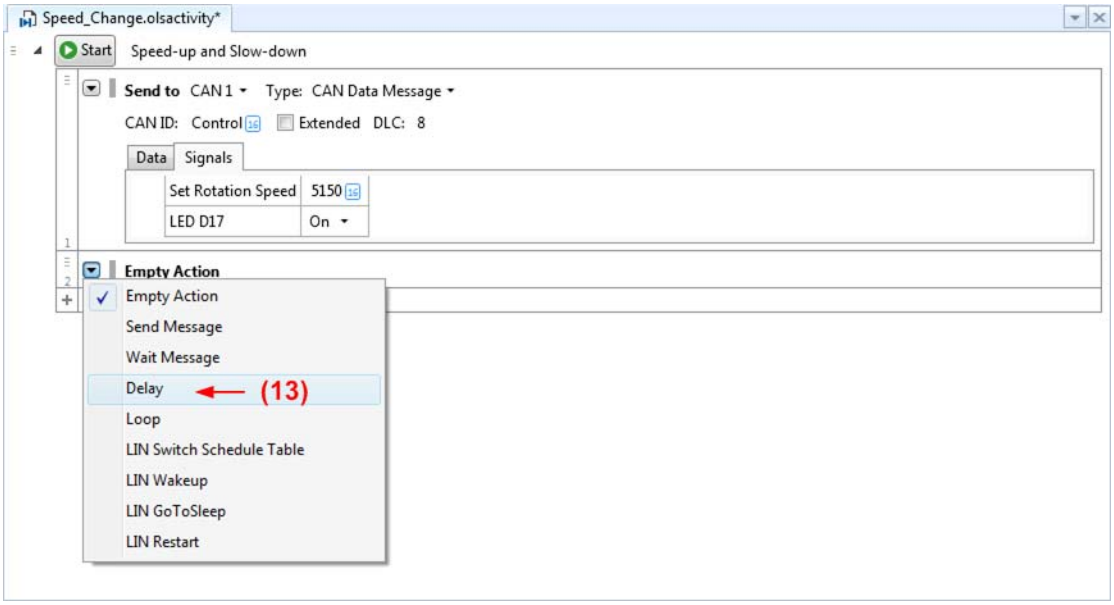

Figure 6.14 Activity - Insert a Delay Step 2

15. Therefore click the **triangle** in front of **Empty Action** and select **Delay (13)**.

Figure 6.15 Activity - Insert a Delay Step 3

16. After inserting **Delay** the application identifies that there are more than one action **(h)** which are automatically enumerated and will be sequentially executed. They are automatically grouped in a sequence **(i)**.

17. Click into the input field to the right of **Delay**, mark the default value **100** and enter **2000 (14)** as value, i.e., the delay will be 2000 ms.

The target of the next steps is to show how to add and customize a predefined message to reduce the speed of the engine. Afterwards actions will be moved per drag & drop.

Notes: The described steps are not directed straightforward but rather showing how to operate within the **Activity** tool.

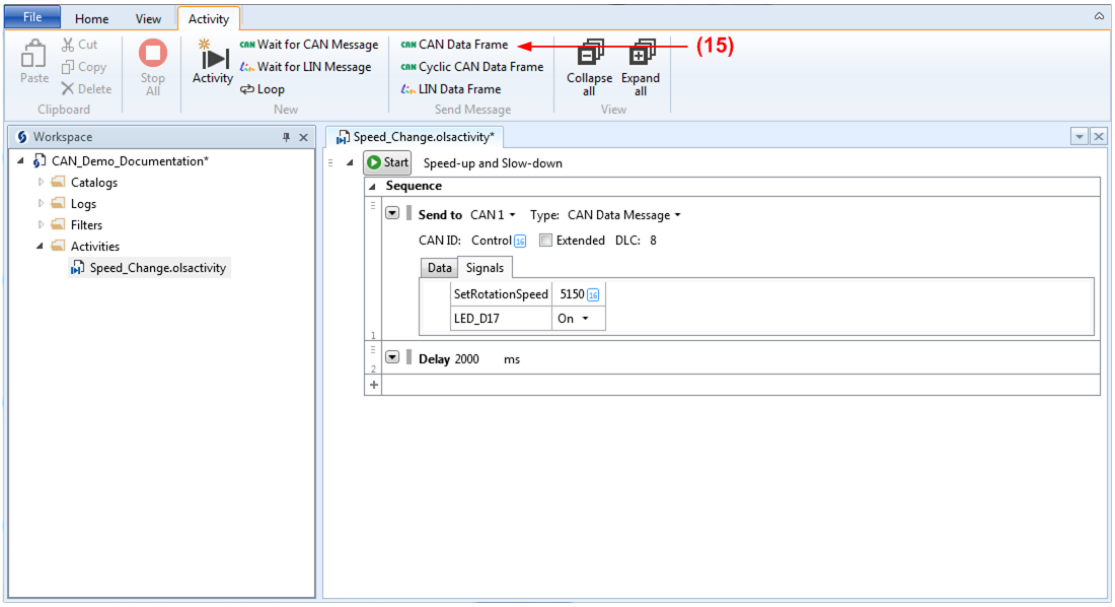

Figure 6.16 Activity - Insert Send Message from Activity Ribbon

18. Click onto **Can Data Frame** **(15)** in the **Activity** ribbon.

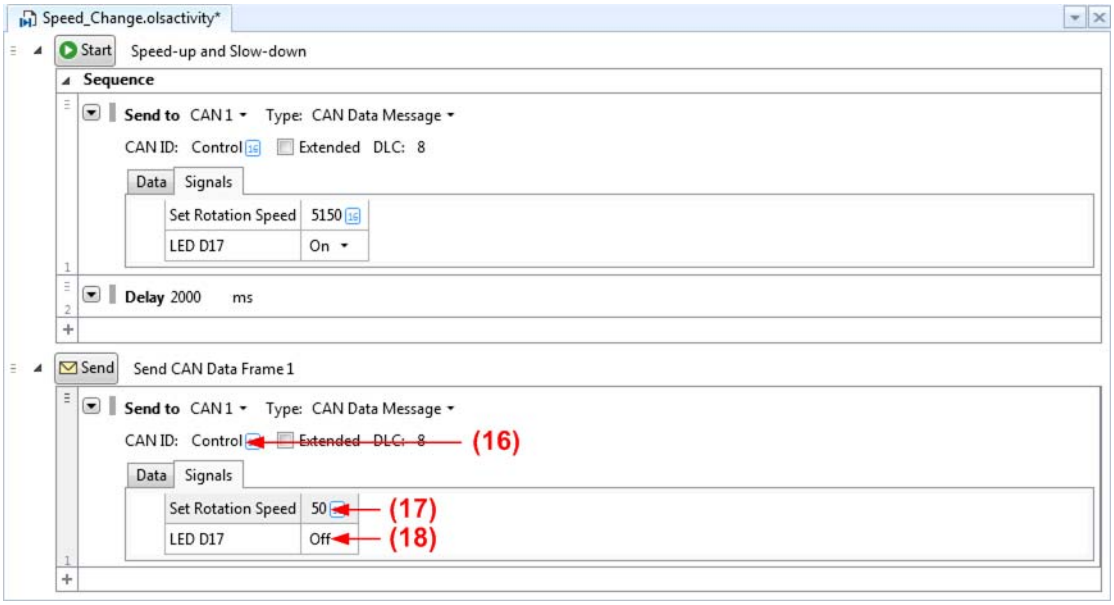

Figure 6.17 Activity - Customize Second Action

19. Another Activity is inserted (named **Send CAN Data Frame1**). By default the first CAN channel of the first device is inserted.

Notes: If more devices are available, click onto the small triangle to open the drop-down box and control whether the desired device and channel are taken.

20. Add the **CAN ID (16)** as described above, i.e., click **Ctrl + Space** to show the pop-up list and select **Control**. Then **double-click** (or press **Enter**). Press **Enter** a second time.
21. Set the rotation speed to **50 (17)**.
22. Change the state of **LED D17** to **Off (18)**, i.e., click the **triangle** next to **On** and select **Off** in the drop-down box.

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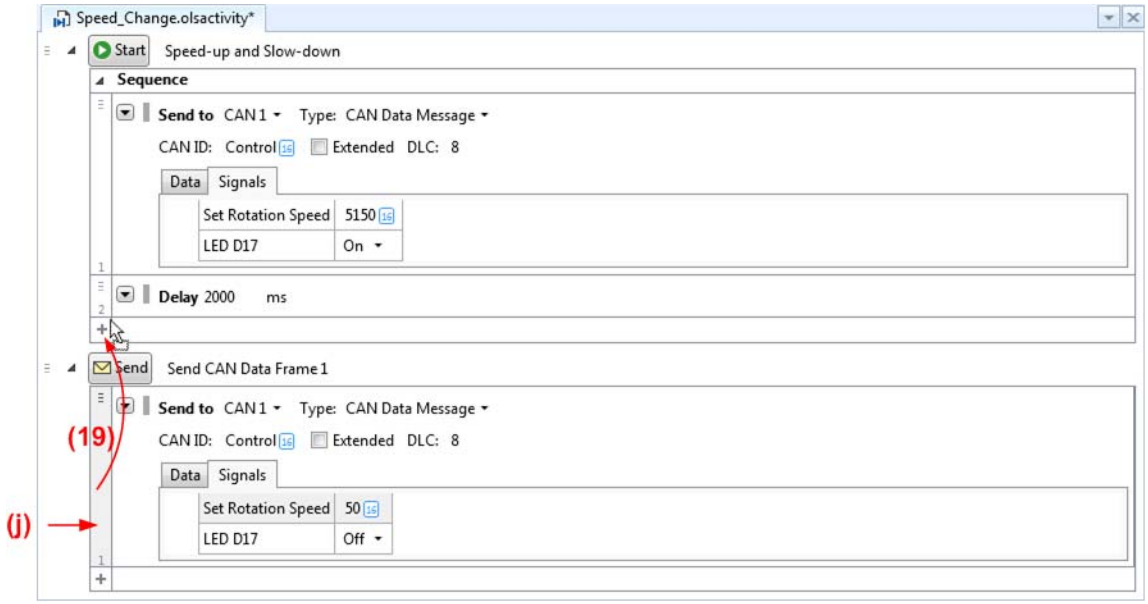

Figure 6.18 Activity - Drag & Drop an Action

23. Select the **handle (j)** of the last action. Then drag and drop **(19)** it to the **plus** sign of the first activity.

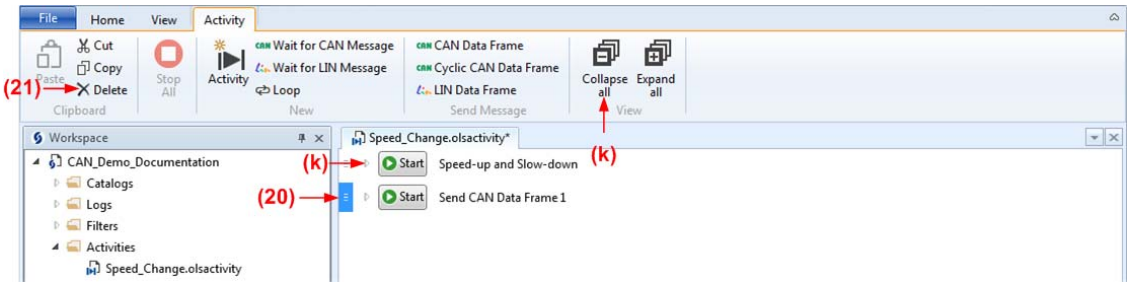

Figure 6.19 Activity - Collapse All

24. In collapsed state **(k)** (click the respective **Collapse All** button before) select the **handle** of the residual activity **(20)** and click **Delete (21)** in the **Activity** ribbon to focus on the first activity.

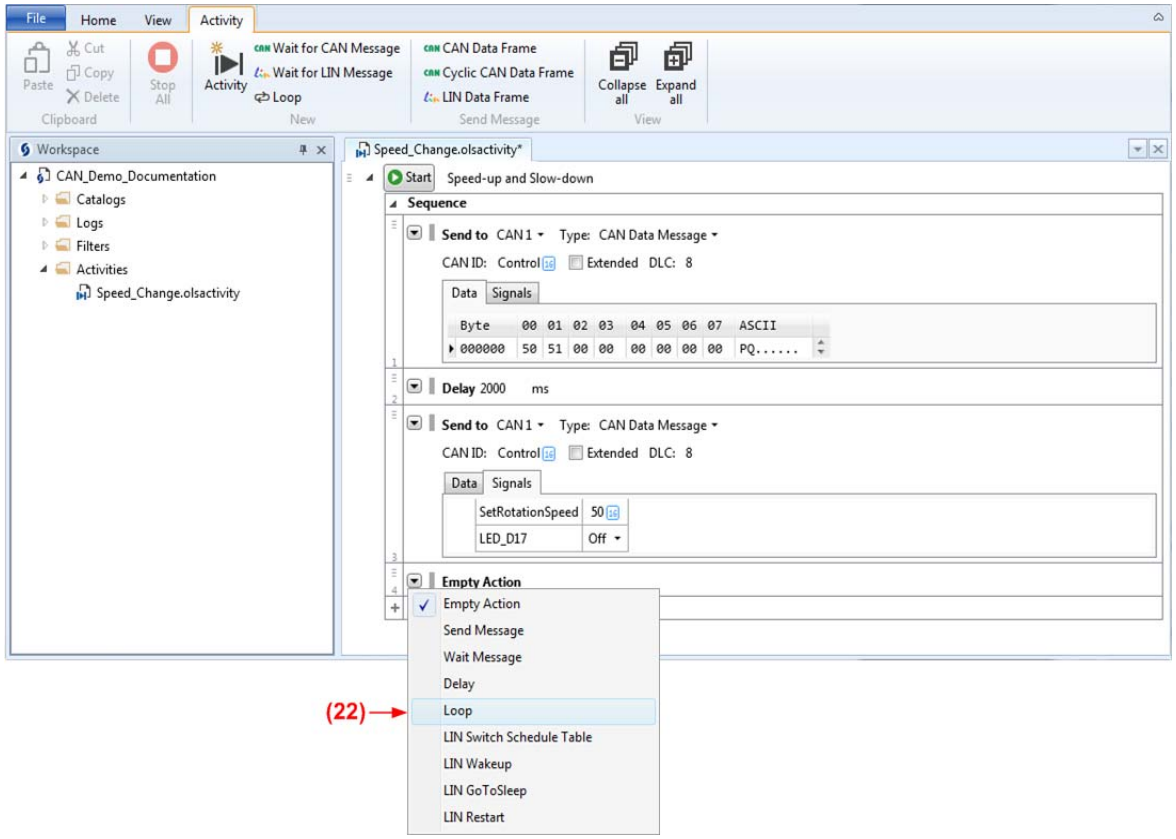

Figure 6.20 Activity - Add Loop

25. In expanded state (click the respective **Expand All** button before) click the **plus** sign to add a new action. An **Empty Action** is added. Click the **triangle** in front of the **Empty Action** to open a drop-down box. Select **Loop (22)**.

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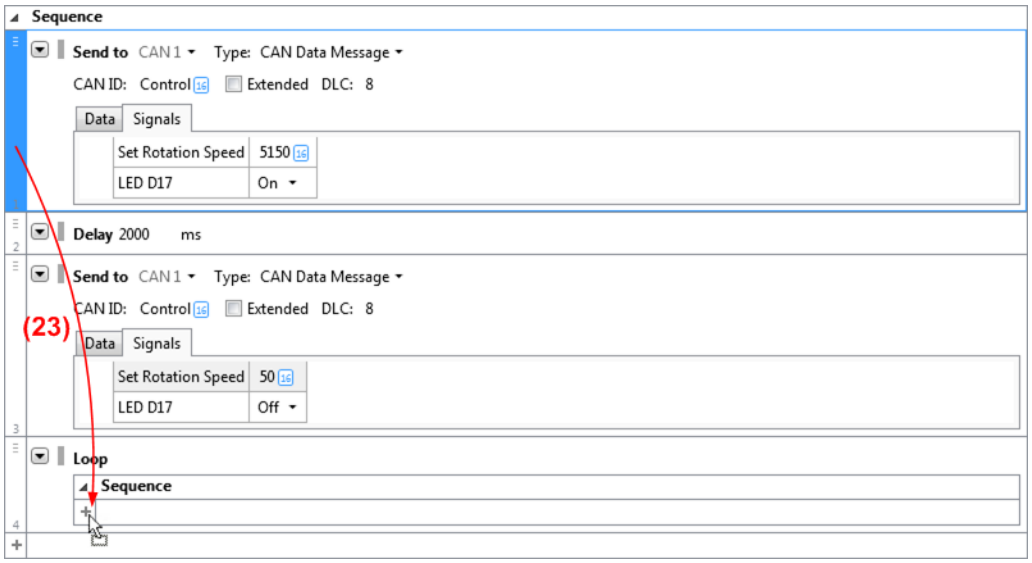

Figure 6.21 Activity - Drag & Drop an Action into Loop

26. Select the **handle** of the Action in which the speed is set to 5150. Drag and drop it to the **plus** sign in the loop **(23)**.

27. Repeat the step above for the **Delay** Action and the Action in which the speed is set low to **50**.

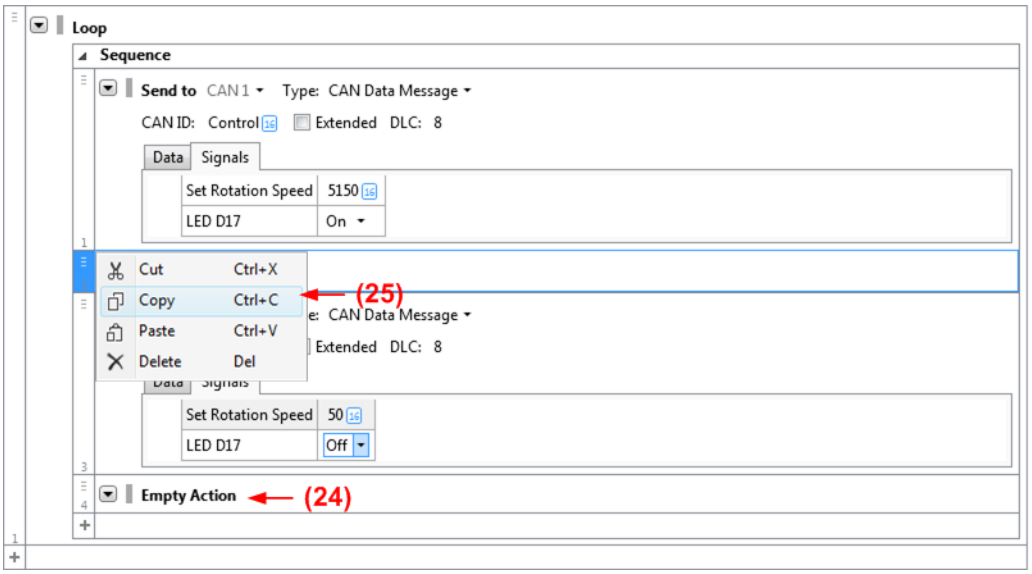

Figure 6.22 Activity - Copy Delay Action

28. Click the **plus** sign to add a new action **(24)**. An **Empty Action** is added. Select the **Delay** action and right-click. Select **Copy (25)**.

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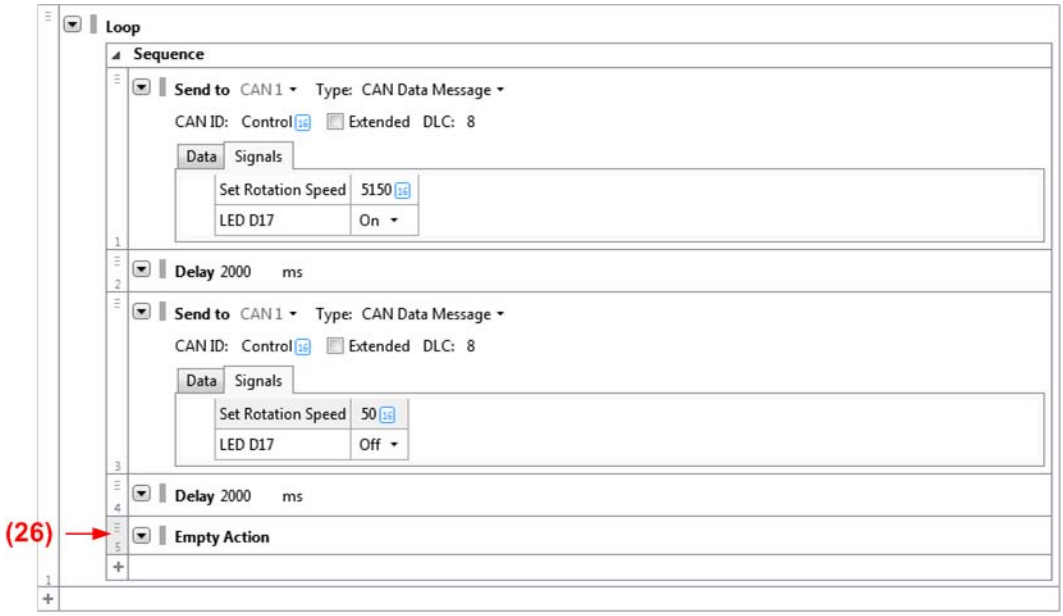

Figure 6.23 Activity - Delete Empty Action

29. Select the **Empty Action** and click **Paste** in the **Activity ribbon**. A **Delay** action is inserted. Delete the remaining **Empty Action** **(26)**.
30. Click the **Save** button in the **Quick Access Bar** to store the **Activity** file.
31. Click the green **Start Logging** button in the **Quick Access Bar** to start an online Trace View.

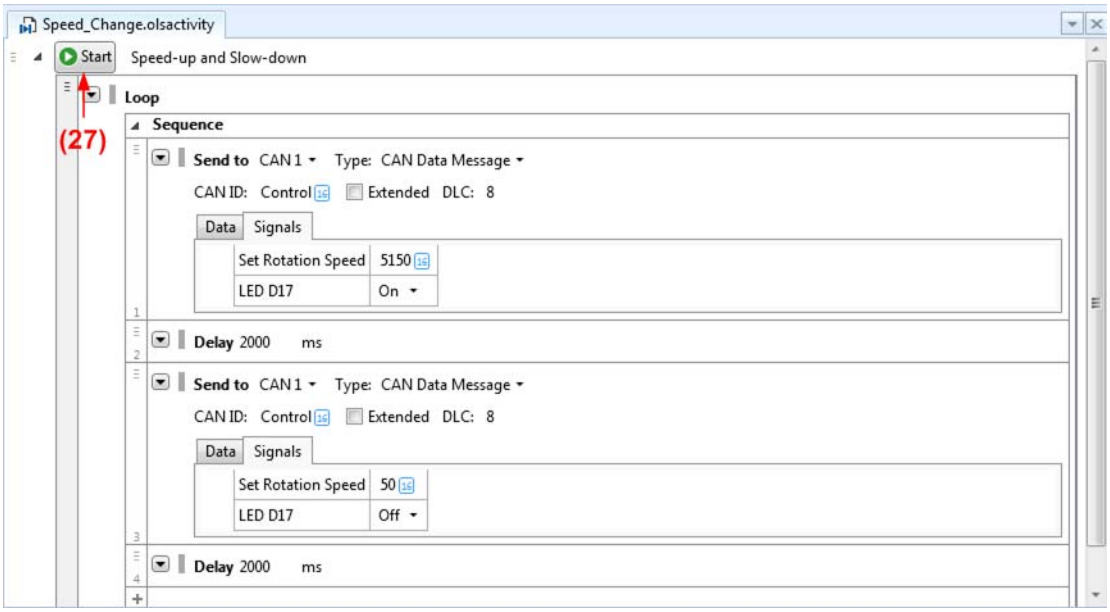

Figure 6.24 Activity - Start

32. Click the **Start** **(27)** button to start this **Activity**. This button is a toggle button that switches between **Start**/**Stop**.

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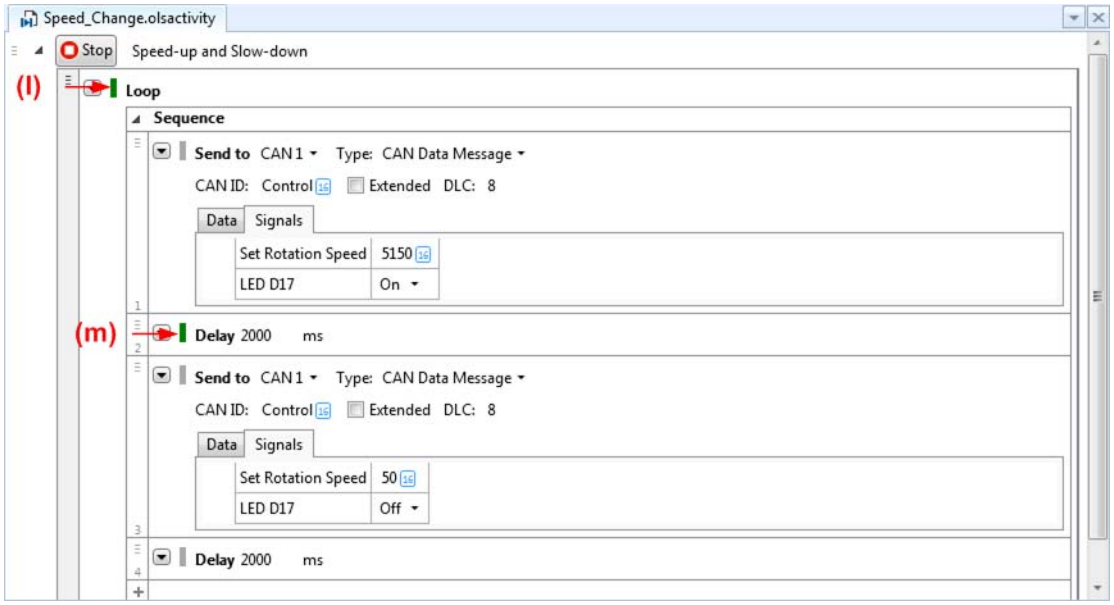

Figure 6.25 Activity - Green LED Activity Indicator

After starting the **Activity** a green LED shows which part of the **Activity** file is active. In the example the **Loop (l)** is active and within the loop the first **Delay (m)** is active.

33. Click the **Stop** button to stop the **Activity**.
34. Click in the **Workspace** window. Then click **File** followed by **Save CAN_Demo_Documentation.olsworkspace**. The workspace inclusive the **Activity** file is saved.
35. Close the OptoLyzer Studio.

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6.1.1 Using Predefined Activity Templates

OptoLyzer Studio provides beside an Empty Activity template **(a)** also predefined Activity templates prepared for the most common use cases.

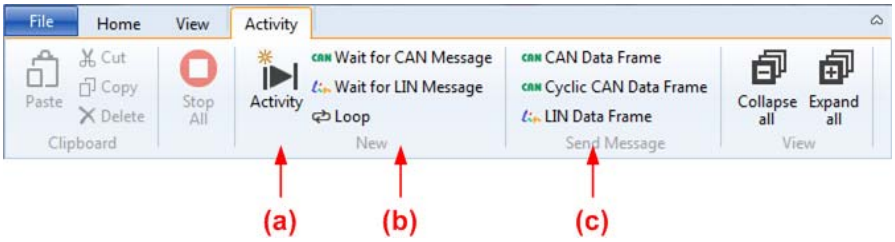

Figure 6.26 Using Predefined Activity Templates

They allow an accelerated creation of activities without starting and customizing from scratch. These templates are arranged in the **Activity** ribbon in the groups **New (b)** and **Send Message (c)**.

The entire procedure starting with step number 4 in Figure 6.3 Activity Ribbon - Add Empty Activity on page 39 can be shortened by using these predefined Activity templates. The following steps cover a brief summary how to proceed instead of those steps.

1. In the Activity ribbon click **Cyclic CAN Data Frame**. A template is added that includes a **Loop** and a **Sequence** consisting of two actions, a **Send Message** action (**CAN Data Frame**) and a **Delay** action. By default, the first CAN channel of the first connected device is inserted in the input field **Send to**. Check whether the default entry is the desired one. In addition, it is necessary to specify the CAN ID to complete the customization of the **Send Message** action. Afterwards adjust the time in the **Delay** action. By default 100 ms are specified.
2. Click the **plus** sign in the **Sequence**. This adds an **Empty Action**.
3. Select the **handle** of the first action in the Sequence (i.e., **CAN Data Frame**), right-click and select **Copy**. Select the **handle** of the **Empty Action** in the Sequence, right-click and select **Paste**.
4. Copy the **Delay** Action and paste it to the **Empty Action** as described in step 3.
5. Select the **handle** of the **Empty Action** in the Sequence and click **Delete** in the **Activity** ribbon (optional step to keep the things simple).
6. Customize the **CAN Data Frame** and **Delay** as mentioned above.
7. Click **Start** to start and **Stop** to stop the Activity.

The example Activity is completed and ready for use.

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Chapter 7 Guided Tour through Graph - Monitor Signals

The OptoLyzer Studio is able to graphically display the progress of properties of messages as time line. The powerful zooming and navigation features allow to focus on values of interest. This functionality is provided in the tool **Graph**.

The chapter below describes how to open the **Graph** and how to zoom on interesting values. One example will show how to measure the timespan of specific values. The sample below is basing on the same example environment as described in Figure 4.1 Example Environment on page 21. In addition, it is assumed that the steps described in Chapter 5, "Guided Tour through Trace View - Monitor Messages," on page 23 and Chapter 6, "Guided Tour through Activity - Send a Message," on page 38 have been performed.

7.1 Start Graph

1. Start OptoLyzer Studio.
2. Load the workspace **CAN_Demo_Documentation.olsworkspace** stored in step 34 in Section 6.1, "Start Activity Tool," on page 38 (i.e., click **File, Open**, navigate to the location where the workspace is stored, select the workspace file and click **Open** or select it from the recent list).
3. Start an online Trace View (i.e., switch to the **Home** ribbon and click **Start**). A Trace View is started.

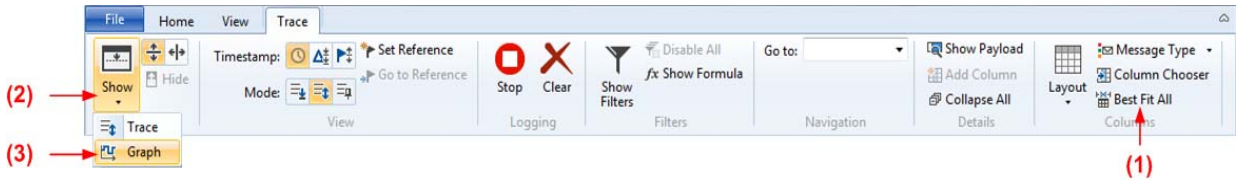

Figure 7.1 Split Trace View and Show Graph

4. In the **Trace** ribbon click **Best Fit All (1)**, **Show (2)** and select **Graph (3)** in the list.

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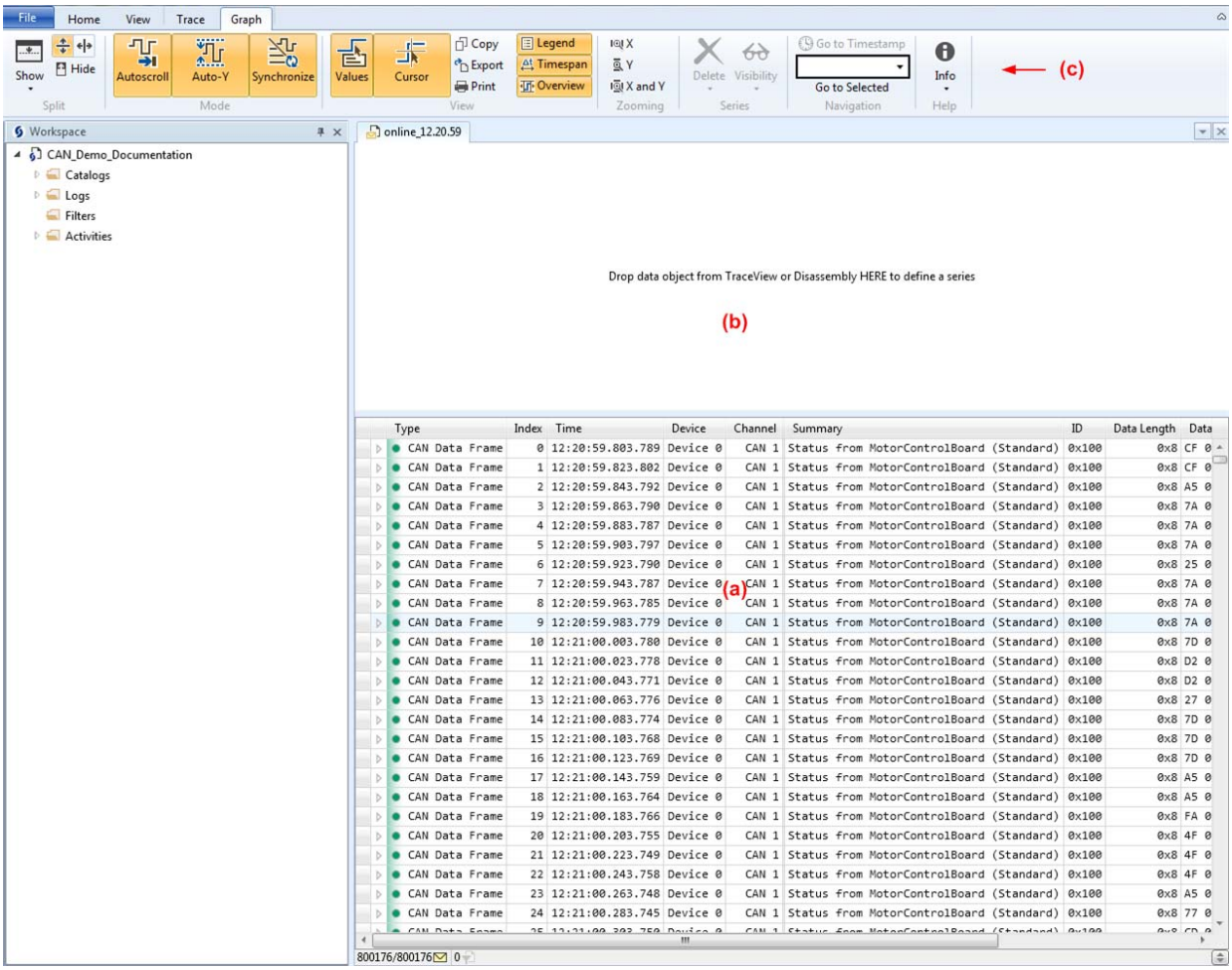
File
Home
View
Trace
Graph
Show
Hide
Split
Autoscroll
Auto-Y
Synchronize
Mode
Values
Cursor
Copy
Export
Print
Legend
Timespan
Overview
View
X
Y
X and Y
Zooming
Delete
Visibility
Series
Go to Timestamp
Go to Selected
Navigation
Info
Help
(c)
Workspace
CAN_Demo_Documentation
Catalogs
Logs
Filters
Activities
online_12.20.59
Drop data object from TraceView or Disassembly HERE to define a series
(b)
(a)
Type Index Time Device Channel Summary ID Data Length Data
CAN Data Frame 0 12:20:59.803.789 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 CF 0
CAN Data Frame 1 12:20:59.823.802 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 CF 0
CAN Data Frame 2 12:20:59.843.792 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 A5 0
CAN Data Frame 3 12:20:59.863.790 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 7A 0
CAN Data Frame 4 12:20:59.883.787 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 7A 0
CAN Data Frame 5 12:20:59.903.797 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 7A 0
CAN Data Frame 6 12:20:59.923.790 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 25 0
CAN Data Frame 7 12:20:59.943.787 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 7A 0
CAN Data Frame 8 12:20:59.963.785 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 7A 0
CAN Data Frame 9 12:20:59.983.779 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 7A 0
CAN Data Frame 10 12:21:00.003.780 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 7D 0
CAN Data Frame 11 12:21:00.023.778 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 D2 0
CAN Data Frame 12 12:21:00.043.771 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 D2 0
CAN Data Frame 13 12:21:00.063.776 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 27 0
CAN Data Frame 14 12:21:00.083.774 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 7D 0
CAN Data Frame 15 12:21:00.103.768 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 7D 0
CAN Data Frame 16 12:21:00.123.769 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 7D 0
CAN Data Frame 17 12:21:00.143.759 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 A5 0
CAN Data Frame 18 12:21:00.163.764 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 A5 0
CAN Data Frame 19 12:21:00.183.766 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 FA 0
CAN Data Frame 20 12:21:00.203.755 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 4F 0
CAN Data Frame 21 12:21:00.223.749 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 4F 0
CAN Data Frame 22 12:21:00.243.758 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 4F 0
CAN Data Frame 23 12:21:00.263.748 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 A5 0
CAN Data Frame 24 12:21:00.283.745 Device 0 CAN 1 Status from MotorControlBoard (Standard) 0x100 0x8 77 0
800176/800176 0

Figure 7.2 Split Windows - Empty Graph

The original area reserved for the **Trace View** is now split in a smaller **Trace View** area **(a)** and an empty area that is reserved for the **Graph** and is showing a hint how to proceed: '**Drop data object from Trace View or Disassembly HERE to define a series**' **(b)**.

After splitting the window the **Graph** ribbon **(c)** is shown. This ribbon is an additional ribbon, i.e., it is only present as long as the Graph has the focus. The new ribbon tab provides access to all functions that are available for the **Graph**. Important functions will be touched within this tour. Both **Split** windows, i.e., **Trace View** and **Graph** refer to the same data source.

Properties of interest are mostly arranged in the body of a message (called **Payload** in OptoLyzer Studio). If they are specified in a **Catalog** and the Catalog is loaded, they can be decoded by the software. Then they are shown as **Signals** in the OptoLyzer Studio.

In the following steps the property that represents the speed of the engine will be copied to the **Graph** and monitored over a time line. Remember that this speed can be modified using the **Activity** created in Section 6.1, "Start Activity Tool," on page 38.

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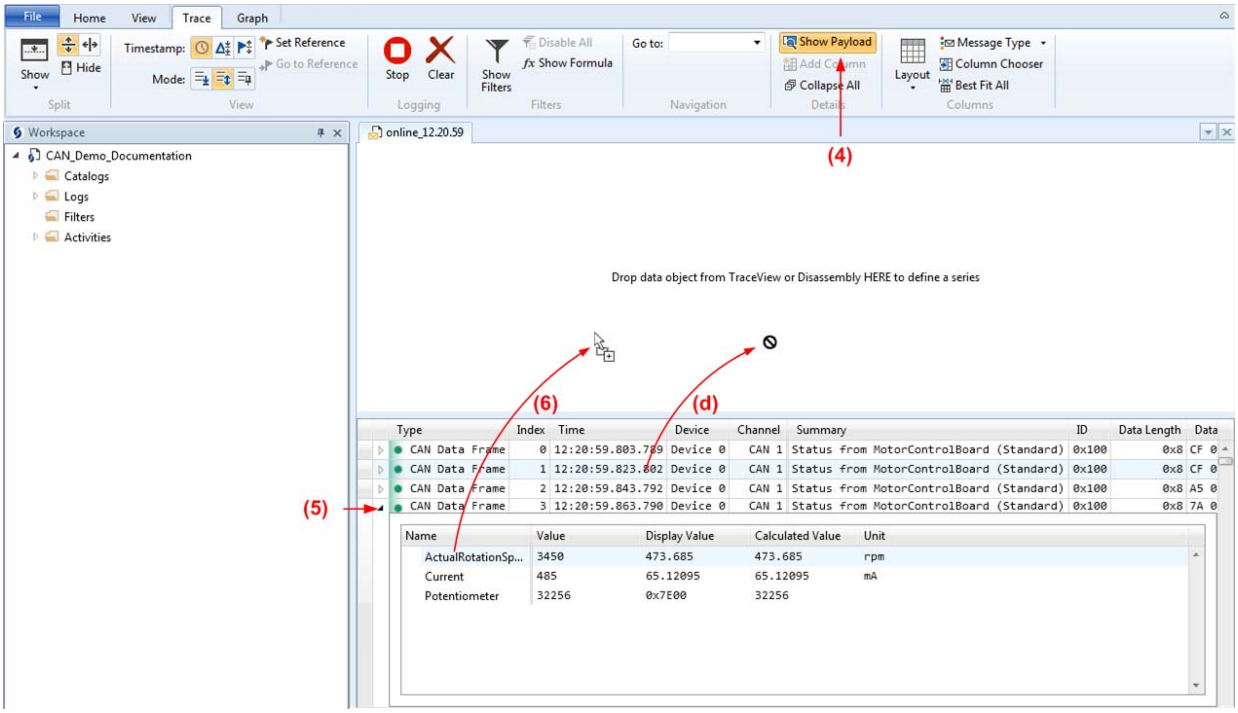

Figure 7.3 Drag & Drop a Property to the Graph

5. Select a message in the **Trace View**. The ribbon tab changes, now showing the **Trace** ribbon. Click **Payload (4)** in the **Trace** ribbon.
6. Click the **small triangle (5)** in front of a message to expand a Detail View. Due to **Payload** is clicked only **Signals** are shown (for comparison purposes view Figure 5.10 or click again **Payload**).
7. Drag & Drop the **Signal ActualRotationSpeed** to the empty area **(6)**.

Notes: Not all properties of a message are designed to be shown in a **Graph** (e.g., it makes no sense to show the time stamp in the **Graph (d)**).
Drag & Drop is also supported from the Disassembly and from the Trace View, if the signal was inserted as column.

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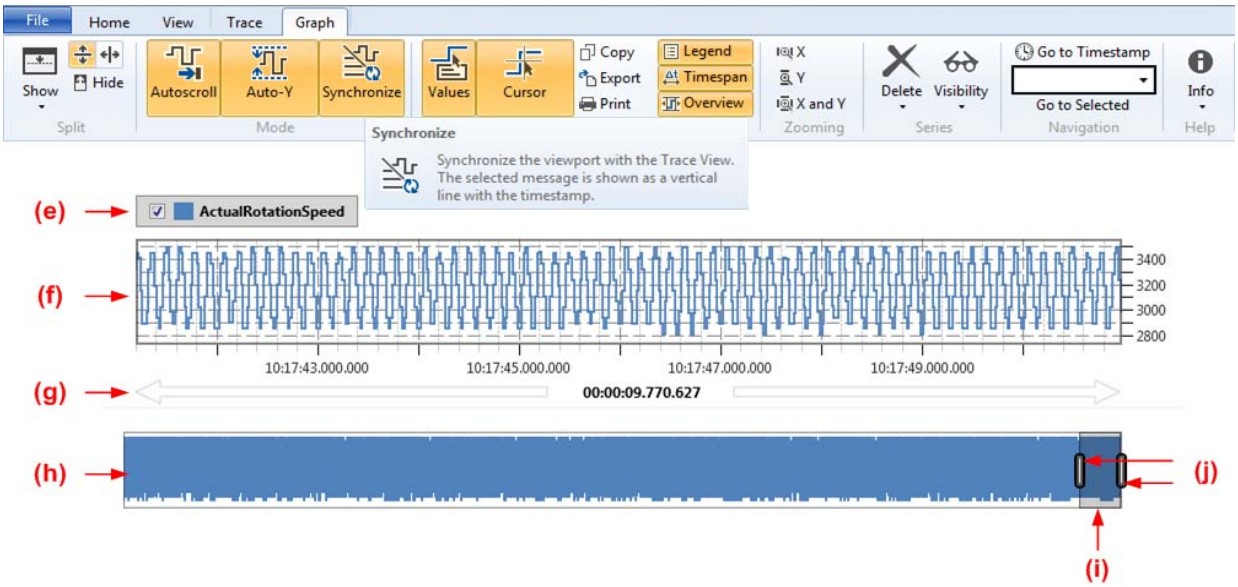

Figure 7.4 Graph Ribbon and Graph Overview

Now the **Signal ActualRotationSpeed** is added to the graphical signal view (**Graph**) **(f)** and is presented in a cartesian coordinate system, where the x-axis represents the time, the y-axis the values. The **Signal** is added to the **Legend** **(e)**. The **Signal** can be unchecked in the Legend. Unchecking hides the Signal in the Graph. The software automatically assigns a color to the Signal that helps to identify the Signal if several signals are added to the Graph. Below the graphical signal view a **Timespan** is shown **(g)**. The timespan itself is determined by the software and depends on the number of signals that are received when starting the Graph. It will be kept as long as it will be manually modified. All values that are received since starting the Graph are shown in an **Overview** **(h)** at the bottom of the graphical signal view. The **Timespan** above **(g)** is presented as part of it **(i)** and is highlighted in gray. This time interval is called **ViewPort** **(i)**. **ViewPort Handles** separate the **ViewPort** within the **Overview**. Both the **ViewPort** and the single **ViewPort Handles** can be moved in the **Overview**. The figures below depict extracts of the **Overview** focusing only on the **ViewPort** and how it is modified and moved.

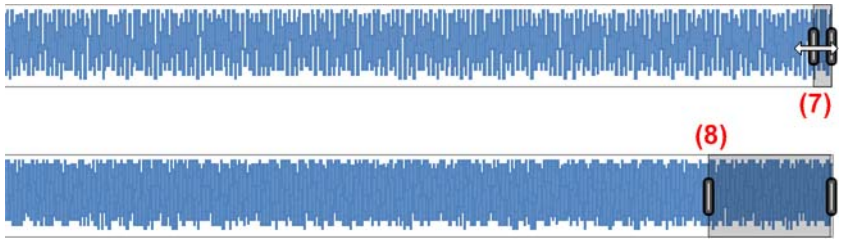

Figure 7.5 Extract Graph Overview - Drag ViewPort Handle

8. Move the mouse cursor over the left **ViewPort** handle **(7)** and drag it to the left side. The width of the **ViewPort** increases **(8)** as well as the value of the **Timespan** **(g)**. In addition, more current values are shown in the **Graph** **(f)** however the granularity decreases.

Notes: As soon as the **ViewPort Handle** is touched, the **Autoscroll** feature is disabled and the **ViewPort** moves in the **Overview**. Just click **Autoscroll** in the **Graph** ribbon to focus on the latest values.

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In the next steps the most important buttons of the Graph ribbon are clicked and explained.

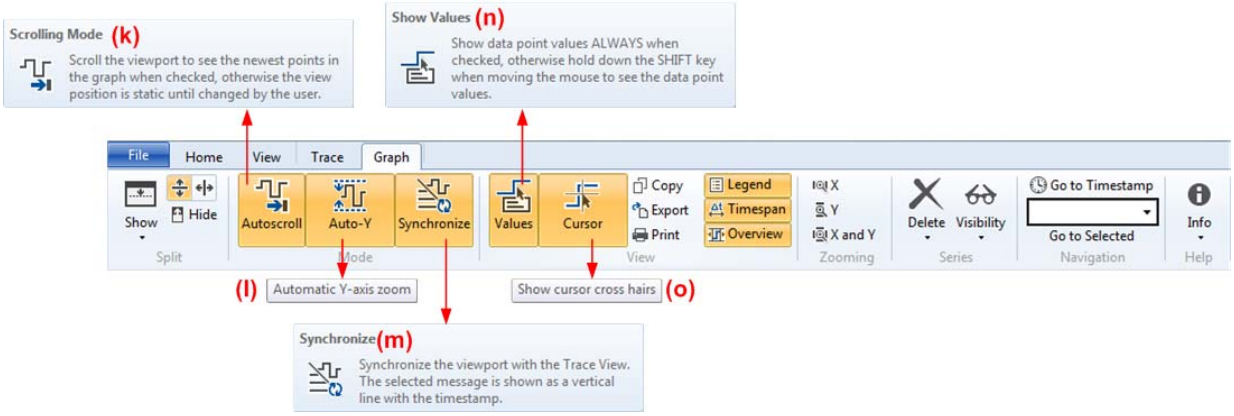

Figure 7.6 Graph Ribbon With Tool Tips

9. Hover over **Autoscroll** (k) to view the tool tip and click the button to disable the **Autoscroll** function. The Graph shows static values, i.e., the snapshot of messages at that time and the ViewPort moves to the left side in the Overview as long as newer messages are coming in. Click **Autoscroll** again. The snapshot of messages at that time and the ViewPort moves to the right corner in the Overview
10. Hover over **Auto-Y** (l) to view the tool tip and click the button to disable the function. The y-axis will keep the current setting. If higher values are received, it might be the maximum value cannot be viewed. Click **Auto-Y** again. If enabled, the y-axis will be automatically adjusted according to the incoming values to show an optimal representation of the incoming values.
11. Hover over **Synchronize** (m) to view the tool tip. A selected value in the Trace View is shown as a vertical line in the Graph (highlighted in orange). A new selection in the Trace View changes the vertical line in the Graph accordingly. Click the button to view the difference in the Graph. Enable the feature again. If **Autoscroll** is enabled, click **Go to Selected** in the Graph ribbon to jump to the message selected in the Trace View.
12. Hover over **Values** (n) to view the tool tip. Hover over the Graph and view how the values are shown. Then click the button to view the different behavior. Click the button again.
13. Hover over **Cursor** to view the tool tip. Click the button and hover over the Graph. Then click **Cursor** again and hover over the Graph. The cross hairs cursor is shown.

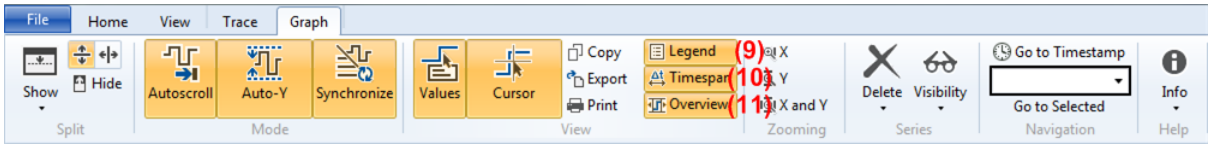

Figure 7.7 Graph - Customize View

14. Click **Legend** (9) in the **Graph** ribbon and view how the **Legend** will be hidden. The **Legend** is located above the Graph. Click the button again to show the **Legend** (default). The signals in a **Legend** can also be checked or unchecked and thus shown or hidden in the Graph.
15. Click **Timespan** (10) in the **Graph** ribbon and view that the **Timespan** located between the **Graph** and the **Overview** is hidden. Click the button again to show the **Timespan**.

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16. Click **Overview** **(11)** in the **Graph** ribbon to hide the **Overview** below the **Timespan**. Click the button again.

In the next steps it will be demonstrated how the Graph can be hidden and shown again.

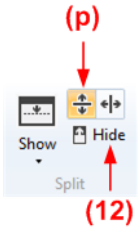
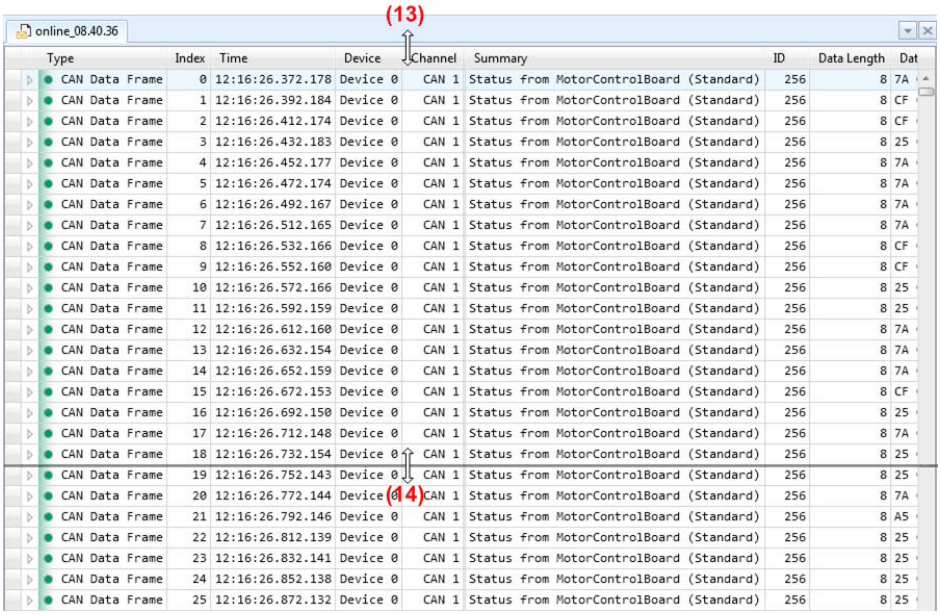


Figure 7.8 Hide and Show Graph per Dragging

17. Click **Hide** **(12)** in the **Graph** ribbon. The Graph will be hidden. The following step is described for a vertical splitting (i.e., the **Vertical Split** button **(p)** is clicked) but can be also performed for a horizontal splitting.



Type	Index	Time	Device	Channel	Summary	ID	Data Length	Dat
CAN Data Frame	0	12:16:26.372.178	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	7A
CAN Data Frame	1	12:16:26.392.184	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	CF
CAN Data Frame	2	12:16:26.412.174	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	CF
CAN Data Frame	3	12:16:26.432.183	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	25
CAN Data Frame	4	12:16:26.452.177	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	7A
CAN Data Frame	5	12:16:26.472.174	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	7A
CAN Data Frame	6	12:16:26.492.167	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	7A
CAN Data Frame	7	12:16:26.512.165	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	7A
CAN Data Frame	8	12:16:26.532.166	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	CF
CAN Data Frame	9	12:16:26.552.160	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	CF
CAN Data Frame	10	12:16:26.572.166	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	25
CAN Data Frame	11	12:16:26.592.159	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	25
CAN Data Frame	12	12:16:26.612.160	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	7A
CAN Data Frame	13	12:16:26.632.154	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	7A
CAN Data Frame	14	12:16:26.652.159	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	7A
CAN Data Frame	15	12:16:26.672.153	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	CF
CAN Data Frame	16	12:16:26.692.150	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	25
CAN Data Frame	17	12:16:26.712.148	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	7A
CAN Data Frame	18	12:16:26.732.154	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	25
CAN Data Frame	19	12:16:26.752.143	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	25
CAN Data Frame	20	12:16:26.772.144	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	7A
CAN Data Frame	21	12:16:26.792.146	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	A5
CAN Data Frame	22	12:16:26.812.139	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	25
CAN Data Frame	23	12:16:26.832.141	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	25
CAN Data Frame	24	12:16:26.852.138	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	25
CAN Data Frame	25	12:16:26.872.132	Device 0	CAN 1	Status from MotorControlBoard (Standard)	256	8	25

Figure 7.9 Show Graph by Dragging - Step 1

18. Move the **mouse cursor** to the top of the Trace View till a **double ended arrow** is visible **(13)**.

19. Drag this **double ended arrow** down **(14)** until enough space is available to show **Legend**, **Graph**, **Timespan** and **Overview** **(q)**.

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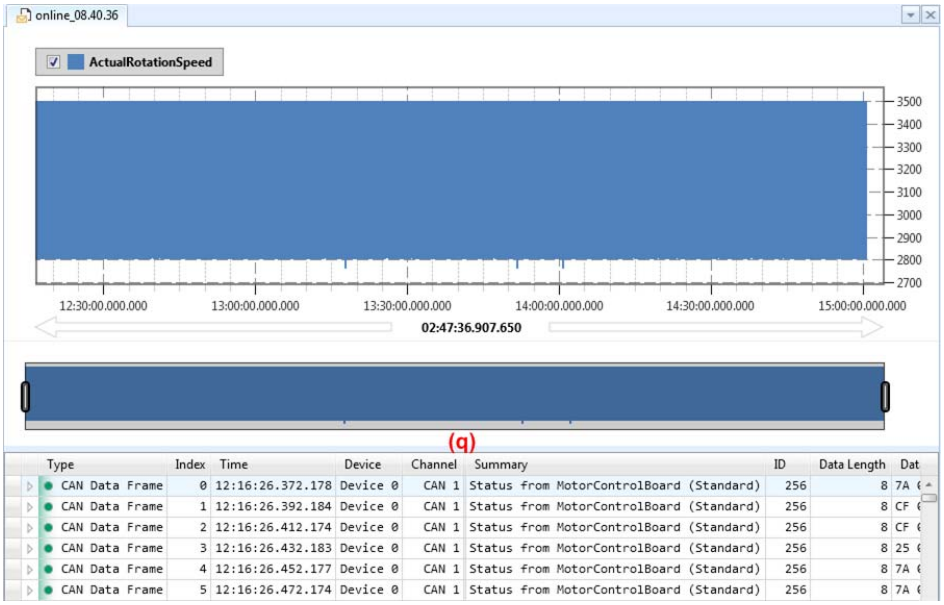
online_08.40.36
ActualRotationSpeed
3500
3400
3300
3200
3100
3000
2900
2800
2700
12:30:00.000.000
13:00:00.000.000
13:30:00.000.000
14:00:00.000.000
14:30:00.000.000
15:00:00.000.000
02:47:36.907.650
(q)
Type Index Time Device Channel Summary ID Data Length Dat
CAN Data Frame 0 12:16:26.372.178 Device 0 CAN 1 Status from MotorControlBoard (Standard) 256 8 7A
CAN Data Frame 1 12:16:26.392.184 Device 0 CAN 1 Status from MotorControlBoard (Standard) 256 8 CF
CAN Data Frame 2 12:16:26.412.174 Device 0 CAN 1 Status from MotorControlBoard (Standard) 256 8 CF
CAN Data Frame 3 12:16:26.432.183 Device 0 CAN 1 Status from MotorControlBoard (Standard) 256 8 25
CAN Data Frame 4 12:16:26.452.177 Device 0 CAN 1 Status from MotorControlBoard (Standard) 256 8 7A
CAN Data Frame 5 12:16:26.472.174 Device 0 CAN 1 Status from MotorControlBoard (Standard) 256 8 7A

Figure 7.10 Show Graph by Dragging - Step 2

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7.1.1 Search and Measure Using the Graph

The Graph can be used to search for spikes or irregularities just by dragging the **ViewPort** in the **Overview**. In addition, the Graph allows a rough time measurement of signals. To show how this can be done this section uses the example environment described in Figure 4.1 Example Environment on page 21. The **Activity** created in Chapter 6 is used to speed up and slow down the engine (i.e., to create spike signals which will be searched in the example).

1. Start OptoLyzer Studio if not yet done.
2. Load the workspace **CAN_Demo_Documentation.olsworkspace** if not loaded by default. I.e., click **File, Open**, navigate to the location where the workspace is stored, select the workspace file and click **Open**.
3. Start an **Online Trace View**. I.e., switch to the **Home** ribbon and click **Start.** A **Trace View** is started.
4. Split the window as shown in Figure 7.1 Split Trace View and Show Graph on page 57. I.e., in the **Trace** ribbon click **Best Fit All**, **Show** and select **Graph** in the list.

Notes: This procedure is described in detail in Section 7.1, "Start Graph," on page 57.

5. Select a message in the **Trace View**. The ribbon tab changes, now showing the **Trace** ribbon. Click **Payload** in the **Trace** ribbon.
6. Click the small triangle in front of a message to expand a Detail View.
7. Drag & Drop the **Signal ActualRotationSpeed** to the empty area. The **Graph** shows the progress of this speed signal.

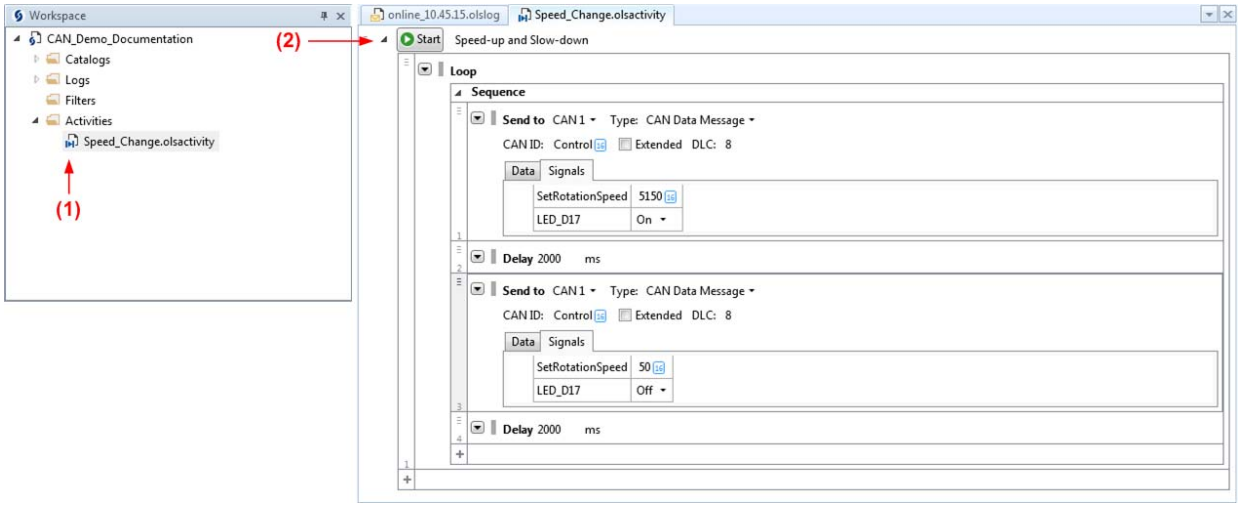

Figure 7.11 Start Activity To Create Spike Signals - Step 1

8. Expand the **Activities** folder in the **Workspace** window and double-click **Speed_Change.olsactivity** **(1)**. Alternatively you can **right-click** and select **Open**.
9. Click **Start** **(2)** and wait for a while (e.g., 9 loops).

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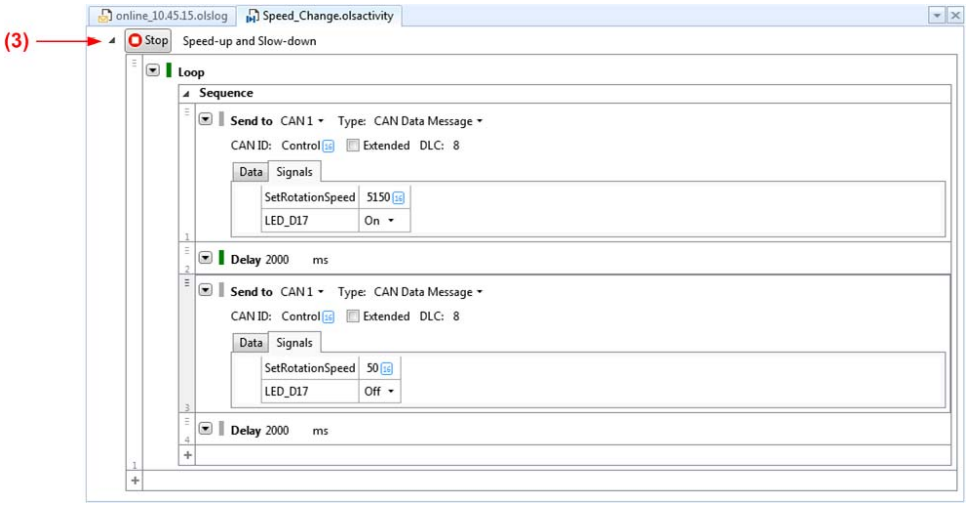

Figure 7.12 Start Activity To Create Spike Signals - Step 2

10. Click **Stop** **(3)**.

Figure 7.13 Searching for Values of Interest by Dragging the ViewPort to the Left Side

11. Switch to the **Online Trace View**. Hover the cursor over the **ViewPort** in the Overview (a hand cursor is shown **(4)**).

12. Start dragging the **ViewPort** to the left side of the **Overview** and search for spikes or irregularities. In Figure 7.13 spikes/irregularities are visible at the beginning of the **Overview** **(a)**.

Notes: In combination with a small **Timespan** interval this procedure can be a first help to find spikes or irregularities or other values of interest very fast and without creating **Filters**.

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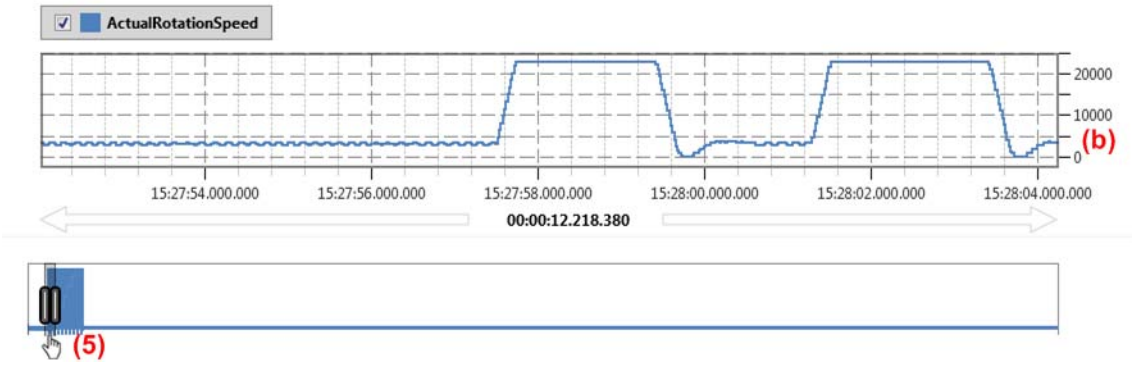

Figure 7.14 Identify Value of Interest

13. Drag the **ViewPort** to the beginning of the 'spikes/irregularities' **(5)**. The y-axis of the **Signal Graph** will be adjusted automatically **(b)** if the respective **Auto-Y** button is activated in the **Graph** ribbon.

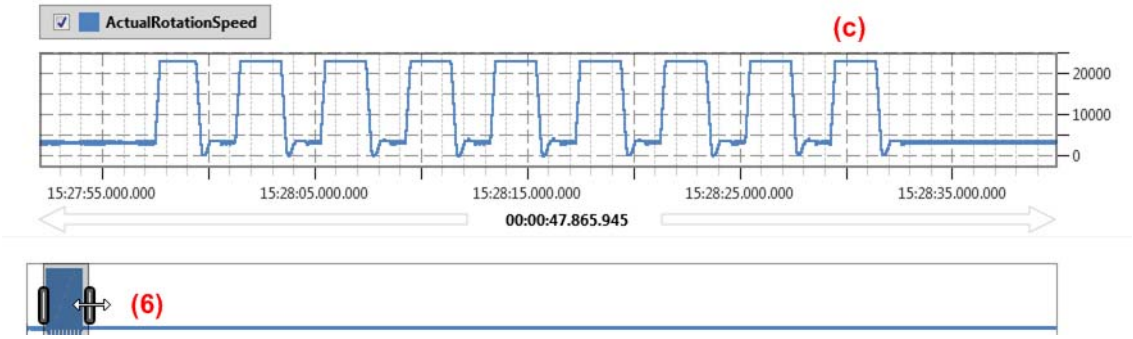

Figure 7.15 Enlarge ViewPort

14. Hover the mouse over the right **ViewPort Handle** till a double ended arrow is visible and drag it to the end of the 'spikes/irregularities' **(6)**. Nine 'spikes/irregularities' are visible in the Graph **(c)** as mentioned in step 9.

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In a next step the duration of a ‘spike’ is measured via the Graph.

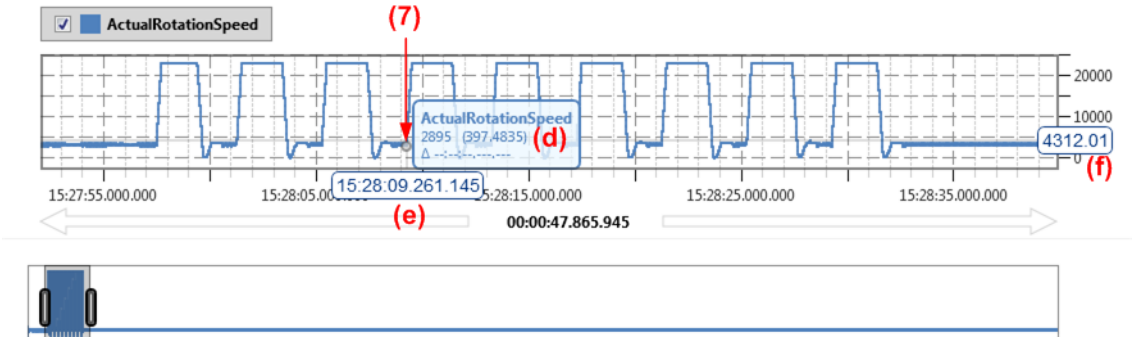

Figure 7.16 Start to Measure Signal Interval - Step 1

15. Hover the cursor to the start of the ramp **(7)**. A **dot** symbol indicates the location within the series. Depending on which buttons are activated in the **Graph** ribbon (Figure 7.6) additional details are shown as e.g., the value for **ActualRotationSpeed (d)**, the cross hairs cursor shows the **time stamp** in the x-axis **(e)** and its **position in the y-axis (f)**.

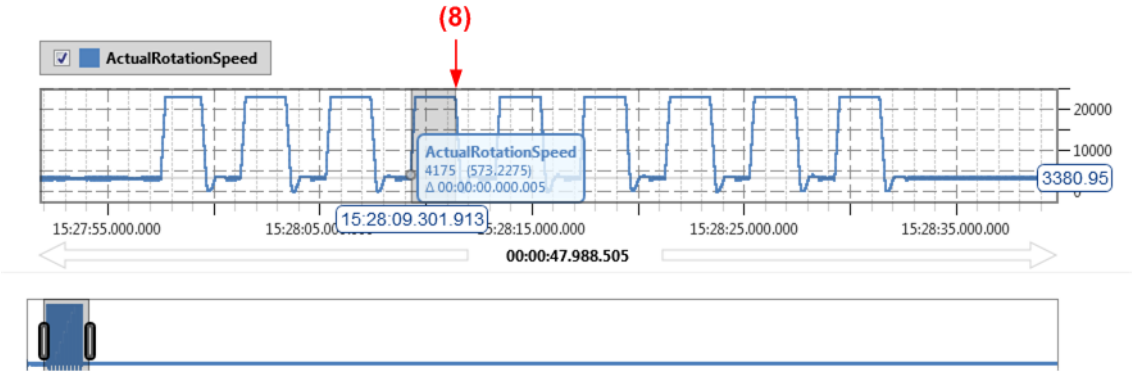

Figure 7.17 Start to Measure Signal Interval - Step 2

16. Drag the cursor from the start of the ramp to the end of the ‘spike’ **(8)** as shown in Figure 7.17. The covered area is highlighted in gray.

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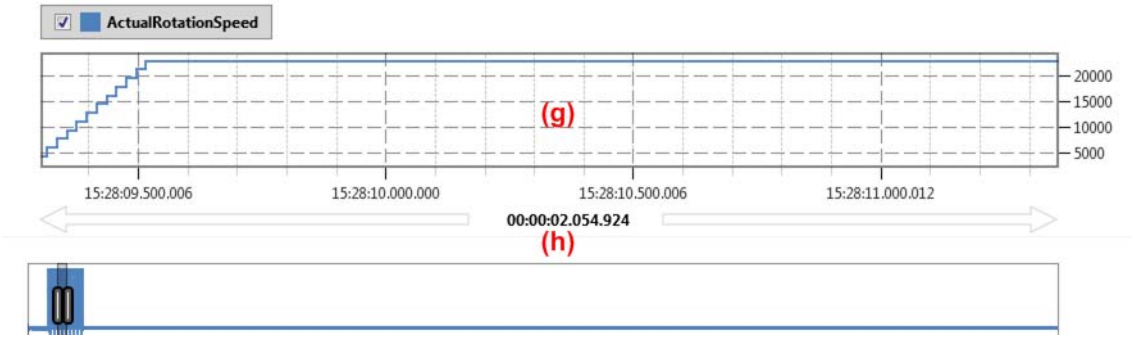

Figure 7.18 Measured Signal Interval

17. After dropping the mouse cursor the **Signal Graph** zooms the x-axis **(g)**. The covered time interval equals the measured time and is shown in the **Timespan (h)**. It nearly matches the value of the delay that has been used in the **Activity** file (Figure 7.11 and Figure 7.12).

18. Save the online file. I.e., click **File** and select **Save As**. Specify name and path.

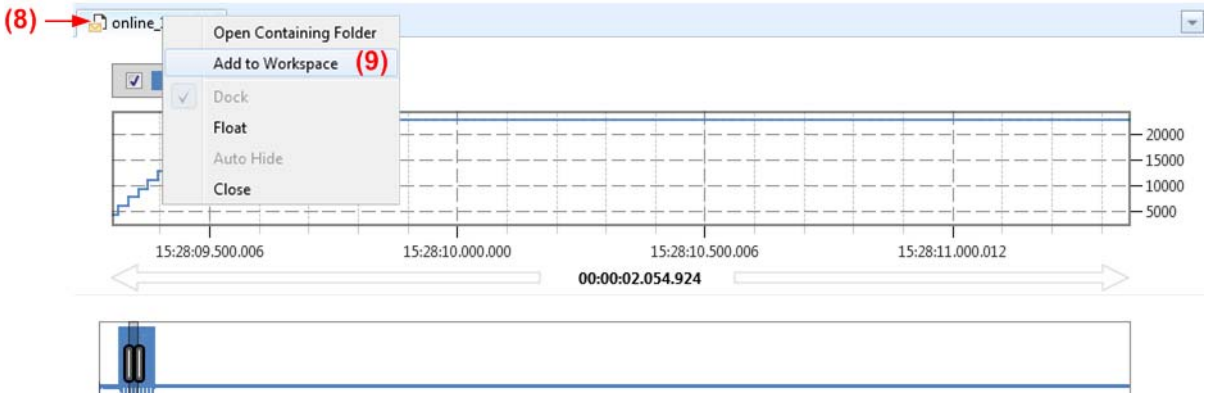

Figure 7.19 Add Online File to Workspace

19. Right-click in the **heading** of the online file **(8)** and select **Add to Workspace (9)** to assign the file to the Workspace.

20. Finally move the file to the **Logs** folder.

21. Save the Workspace.

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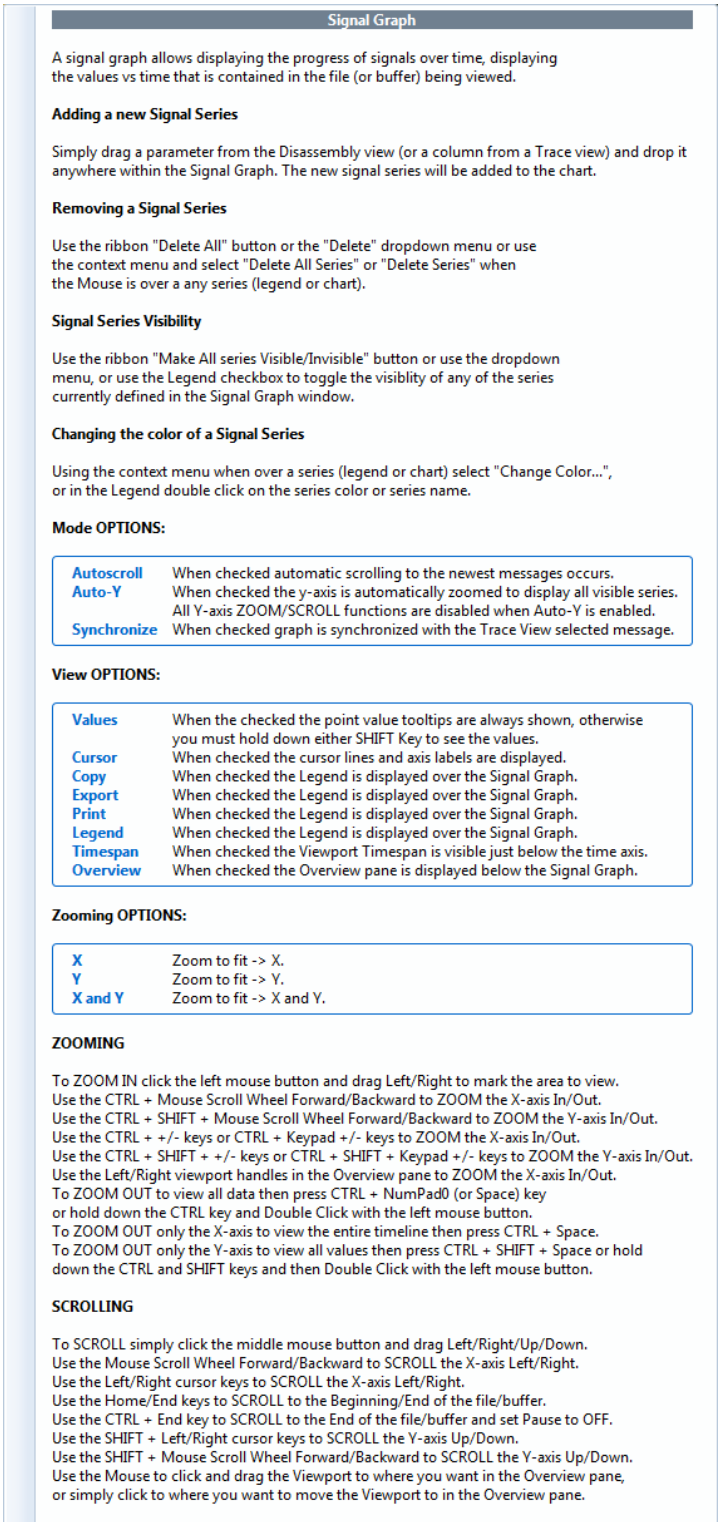
7.1.2 Online Help in Signal Graph

1. To view the comfortable online help click **Info** in the Signal Graph ribbon (Figure 7.4).



Signal Graph

A signal graph allows displaying the progress of signals over time, displaying the values vs time that is contained in the file (or buffer) being viewed.

Adding a new Signal Series

Simply drag a parameter from the Disassembly view (or a column from a Trace view) and drop it anywhere within the Signal Graph. The new signal series will be added to the chart.

Removing a Signal Series

Use the ribbon "Delete All" button or the "Delete" dropdown menu or use the context menu and select "Delete All Series" or "Delete Series" when the Mouse is over a any series (legend or chart).

Signal Series Visibility

Use the ribbon "Make All series Visible/Invisible" button or use the dropdown menu, or use the Legend checkbox to toggle the visiblity of any of the series currently defined in the Signal Graph window.

Changing the color of a Signal Series

Using the context menu when over a series (legend or chart) select "Change Color...", or in the Legend double click on the series color or series name.

Mode OPTIONS:

Autoscroll	When checked automatic scrolling to the newest messages occurs.
Auto-Y	When checked the y-axis is automatically zoomed to display all visible series. All Y-axis ZOOM/SCROLL functions are disabled when Auto-Y is enabled.
Synchronize	When checked graph is synchronized with the Trace View selected message.

View OPTIONS:

Values	When the checked the point value tooltips are always shown, otherwise you must hold down either SHIFT Key to see the values.
Cursor	When checked the cursor lines and axis labels are displayed.
Copy	When checked the Legend is displayed over the Signal Graph.
Export	When checked the Legend is displayed over the Signal Graph.
Print	When checked the Legend is displayed over the Signal Graph.
Legend	When checked the Legend is displayed over the Signal Graph.
Timespan	When checked the Viewport Timespan is visible just below the time axis.
Overview	When checked the Overview pane is displayed below the Signal Graph.

Zooming OPTIONS:

X	Zoom to fit -> X.
Y	Zoom to fit -> Y.
X and Y	Zoom to fit -> X and Y.

ZOOMING

To ZOOM IN click the left mouse button and drag Left/Right to mark the area to view.
Use the CTRL + Mouse Scroll Wheel Forward/Backward to ZOOM the X-axis In/Out.
Use the CTRL + SHIFT + Mouse Scroll Wheel Forward/Backward to ZOOM the Y-axis In/Out.
Use the CTRL + +/- keys or CTRL + Keypad +/- keys to ZOOM the X-axis In/Out.
Use the CTRL + SHIFT + +/- keys or CTRL + SHIFT + Keypad +/- keys to ZOOM the Y-axis In/Out.
Use the Left/Right viewport handles in the Overview pane to ZOOM the X-axis In/Out.
To ZOOM OUT to view all data then press CTRL + NumPad0 (or Space) key or hold down the CTRL key and Double Click with the left mouse button.
To ZOOM OUT only the X-axis to view the entire timeline then press CTRL + Space.
To ZOOM OUT only the Y-axis to view all values then press CTRL + SHIFT + Space or hold down the CTRL and SHIFT keys and then Double Click with the left mouse button.

SCROLLING

To SCROLL simply click the middle mouse button and drag Left/Right/Up/Down.
Use the Mouse Scroll Wheel Forward/Backward to SCROLL the X-axis Left/Right.
Use the Left/Right cursor keys to SCROLL the X-axis Left/Right.
Use the Home/End keys to SCROLL to the Beginning/End of the file/buffer.
Use the CTRL + End key to SCROLL to the End of the file/buffer and set Pause to OFF.
Use the SHIFT + Left/Right cursor keys to SCROLL the Y-axis Up/Down.
Use the SHIFT + Mouse Scroll Wheel Forward/Backward to SCROLL the Y-axis Up/Down.
Use the Mouse to click and drag the Viewport to where you want in the Overview pane, or simply click to where you want to move the Viewport to in the Overview pane.

Figure 7.20 Signal Graph Online Help

Chapter 8 Creating Filters

A **Filter** provides a set of conditions identifying a set of messages. **Filters** can be used for example in Trace Views to reduce the number of displayed messages. The OptoLyzer Studio provides three types of Filters:

- Protocol Filters (immediately available in each Trace View)
- Channel Filters (dependent on the connected device, immediately available in each Trace View)
- User defined Filters stored in *.olsfilter files

The OptoLyzer Studio already comes with a set of default Filters. They are ready for use and allow to focus on values of interest. These Filters are available in each **Trace View**. They are described in Section 8.2. Section 8.3, "Protocol Filters Versus Channel Filters," on page 74 gives a brief overview about the interconnection of Protocol Filters and Channel Filters. Powerful and flexible Filters can be designed by the user. Section 8.4, "How To Create User Defined Filters," on page 77 provides a short introduction how they can be created. Section 8.4.1, "Fast Alternative How To Add a Filter Condition," on page 89 offers a fast method how conditions can be added.

The samples below are basing on the same example environment as described in Figure 4.1 Example Environment on page 21. In addition, it is assumed that the steps described in Chapter 5, "Guided Tour through Trace View - Monitor Messages," on page 23 and Chapter 6, "Guided Tour through Activity - Send a Message," on page 38 have been performed.

8.1 Good To Know When Working with Filters

1. A filter is a condition, which can be applied to block (hide) or to pass-through (show) the message in each specified trace window independently.
2. Blocking filters are dominant, passing filters are recessive: This means if a blocking filter and a passing filter match on a message, the blocking filter wins and the message is blocked.
3. Blocking Protocol Filters override the entire setting on Channel Filter level that has been customized for the same protocol type. An example is described in Section 8.3, "Protocol Filters Versus Channel Filters," on page 74.
4. Filters are using the raw value that is transmitted over the bus system (e.g., CAN bus system). Refer to Figure 5.9 on page 30. The raw values can be monitored in the Detail View in the Trace View (step 13 in Section 5.1) or in the Disassembly View (Section 9.1, "Disassembly," on page 90).

Notes: If you enter the Display Value and enable a Filter in a Trace View you might think the Filter is not working properly. Always ensure you enter the raw value in Filter conditions.

5. Filters activated for a Trace View don't have any impact on the Signal Graph.
6. Signals can be copied from the Detail View (Section 8.4.1, "Fast Alternative How To Add a Filter Condition," on page 89), Trace View and Disassembly view to create a Filter condition.
7. If you enable one passing filter, only matching messages can pass. However this means also that this passing filter is a blocking filter for all other messages (keep in mind that this does not mean a blocking filter is specified). If you enable one passing filter, you have to specify for each kind of message you want to see in a Trace View its own passing filter.

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8.2 Show Filters

1. Start OptoLyzer Studio if necessary.
2. Load the workspace **CAN_Demo_Documentation.olsworkspace** stored in the sections before if necessary. I.e., click **File**, **Open**, navigate to the location where the workspace is stored, select the workspace file and click **Open**.
3. If not automatically shown, open the **Trace View** file that has finally been stored in Chapter 7, "Guided Tour through Graph - Monitor Signals," on page 57. I.e., in the **Workspace** expand **Logs**, select the stored **Trace View** and double-click it. The **Trace View** opens.

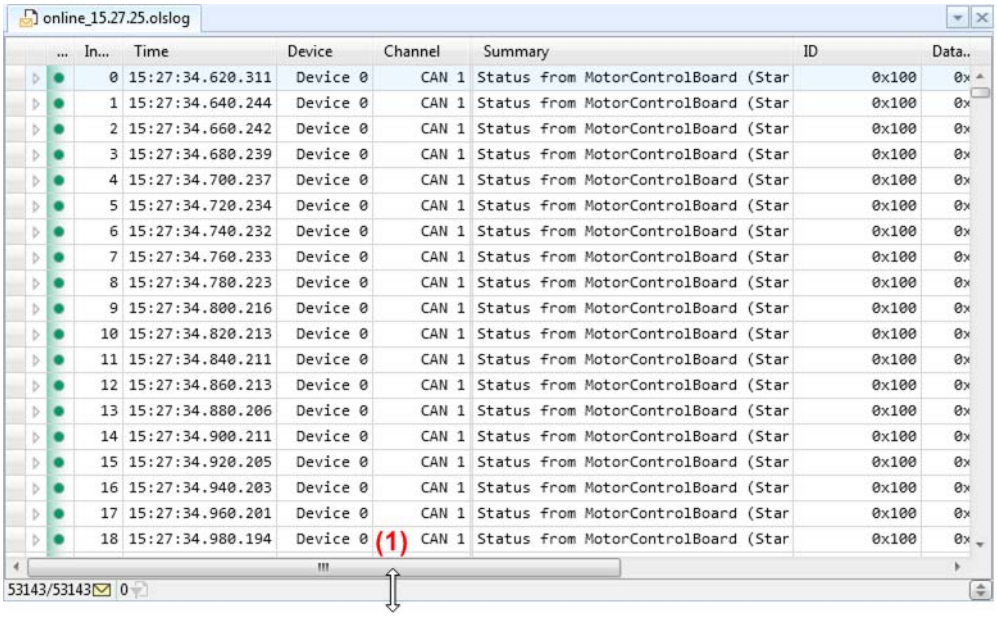
online_15.27.25.olslog
... In... Time Device Channel Summary ID Data..
0 15:27:34.620.311 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
1 15:27:34.640.244 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
2 15:27:34.660.242 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
3 15:27:34.680.239 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
4 15:27:34.700.237 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
5 15:27:34.720.234 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
6 15:27:34.740.232 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
7 15:27:34.760.233 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
8 15:27:34.780.223 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
9 15:27:34.800.216 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
10 15:27:34.820.213 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
11 15:27:34.840.211 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
12 15:27:34.860.213 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
13 15:27:34.880.206 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
14 15:27:34.900.211 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
15 15:27:34.920.205 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
16 15:27:34.940.203 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
17 15:27:34.960.201 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100 0x
18 15:27:34.980.194 Device 0 (1) CAN 1 Status from MotorControlBoard (Star 0x100 0x
53143/53143 0

Figure 8.1 Show Filters - Step 1

4. Move the mouse cursor over the status bar of the **Trace View** till a double ended arrow is visible **(1)**.

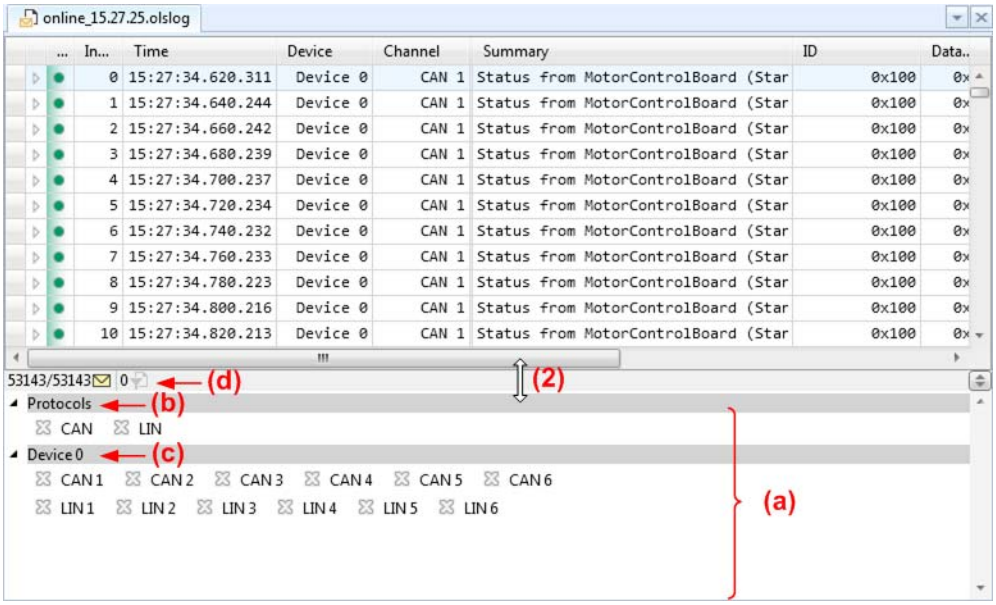
online_15.27.25.olslog
... In... Time Device Channel Summary ID Data..
0 15:27:34.620.311 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
1 15:27:34.640.244 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
2 15:27:34.660.242 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
3 15:27:34.680.239 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
4 15:27:34.700.237 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
5 15:27:34.720.234 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
6 15:27:34.740.232 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
7 15:27:34.760.233 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
8 15:27:34.780.223 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
9 15:27:34.800.216 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
10 15:27:34.820.213 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
53143/53143 0
(d)
(2)
Protocols
(b)
CAN LIN
Device 0
(c)
CAN 1 CAN 2 CAN 3 CAN 4 CAN 5 CAN 6
LIN 1 LIN 2 LIN 3 LIN 4 LIN 5 LIN 6
(a)

Figure 8.2 Show Filters - Step 2

5. Drag this double ended arrow up **(2)** to show the hidden default **Filters (a)**. In parallel, the **Show Filters** button becomes enabled in the **Trace View** ribbon when moving up.

Two types of default Filters are available. Each of them is arranged in its own section:

- Protocol Filters **(b)**
- Channel Filters whereby Channel Filters belong to a connected device **(c)**. Each connected device is shown in a separate section.

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The default Filters are described in the Table 8.1 below.

Table 8.1 Default Filters

Filter	Icon	Description
Protocol **(b)**		Protocol Filters allow to filter all messages of a protocol family. ▪ If Protocol Filters are not clicked (default), all messages of that protocol are displayed (if not blocked by another filter). ▪ If Protocol Filters are selected, i.e., are in blocking mode, all messages of that protocol are blocked (not displayed). Each supported protocol can be controlled by its own Protocol Filter. It depends on the OptoLyzer Studio Edition license which Protocol Filters are supported. Right now there are a CAN and a LIN Protocol Filter. The respective button in front of a channel is a toggle button. Two modes are possible:
		The Protocol Filter is not clicked, i.e., not active (default). This means all messages are passing.
		The Protocol Filter is clicked. All messages of the selected protocol type are blocked. By default, all corresponding channels of the connected devices are blocked. The Filter counter in the status bar increases **(d)**.
Device **(c)**		Each connected device is arranged in its own section showing all of its channels. If an offline log file is used, the devices stored in the log file are shown if available. Each channel of the connected device gets its own Channel Filter. A Channel Filter allows to filter all messages of a channel (e.g., CAN1, CAN2, ...). ▪ If Channel Filters are not clicked (default), all messages of that channel are displayed (if not blocked by another filter). ▪ If Channel Filters are selected, i.e., are in blocking mode, all messages of that channel are blocked (not displayed). Each channel can be controlled by its own Channel Filter. It depends on the connected device which and how many Channel Filters are supported. Supported devices are listed in Section 1.2.2, "OptoLyzer Studio and Hardware," on page 8. The respective button in front of a channel is a toggle button. Two modes are possible:
		The Channel Filter is not clicked, i.e., not active (default). This means all messages are passing.
		The Channel Filter is clicked. All messages of the selected protocol type are blocked. The Filter counter in the status bar increases **(d)**.

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8.3 Protocol Filters Versus Channel Filters

Notes: Blocking Protocol Filters override the entire setting on Channel Filter level that has been customized for the same protocol type.

The example below demonstrates this behavior.

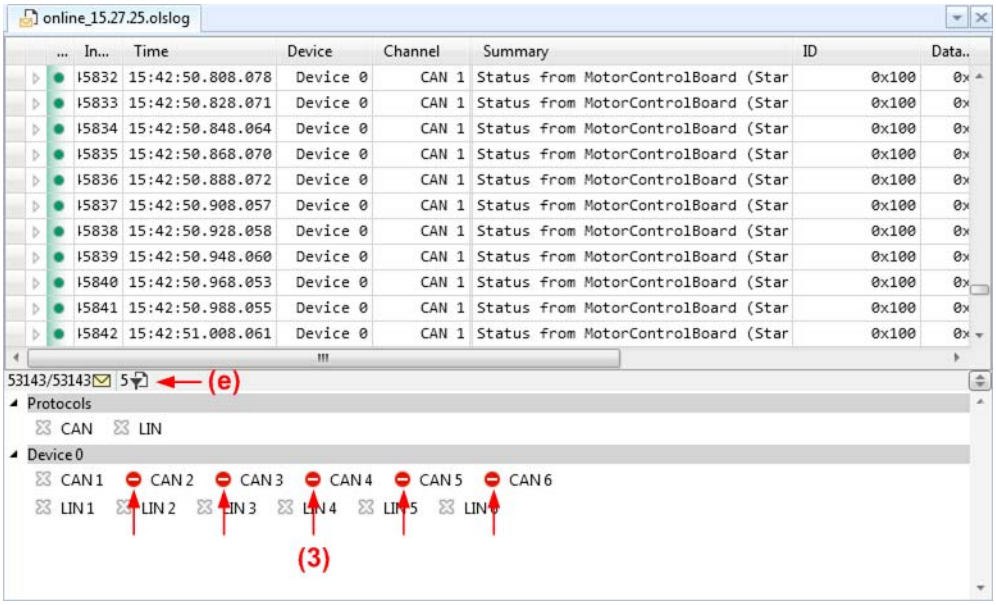
online_15.27.25.olslog
... In... Time Device Channel Summary ID Data..
15832 15:42:50.808.078 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
15833 15:42:50.828.071 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
15834 15:42:50.848.064 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
15835 15:42:50.868.070 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
15836 15:42:50.888.072 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
15837 15:42:50.908.057 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
15838 15:42:50.928.058 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
15839 15:42:50.948.060 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
15840 15:42:50.968.053 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
15841 15:42:50.988.055 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
15842 15:42:51.008.061 Device 0 CAN 1 Status from MotorControlBoard (Star 0x100
53143/53143 5
(e)
Protocols
CAN LIN
Device 0
CAN 1 CAN 2 CAN 3 CAN 4 CAN 5 CAN 6
LIN 1 LIN 2 LIN 3 LIN 4 LIN 5 LIN 6
(3)

Figure 8.3 Enable CAN Channel Filters

For example. If the CAN Protocol Filter is clicked and switches into blocking mode, all CAN channels of a connected device will be blocked independently of their customization before. Even if all of them have been switched into blocking mode, one Filter will be shown as active in the status bar.

1. Click **CAN2**, **CAN3**, **CAN4**, **CAN5**, **CAN6** **(3)** in the section of **Device 0**. These Channel Filters are enabled afterwards and switch to blocking mode. As no message has been received via these channels no message is blocked as visible in Figure 8.3. The first value in the status bar **(e)** shows how many messages are shown depending on the filter settings, the second value shows how many messages are received. In addition, five Channel Filters are activated.

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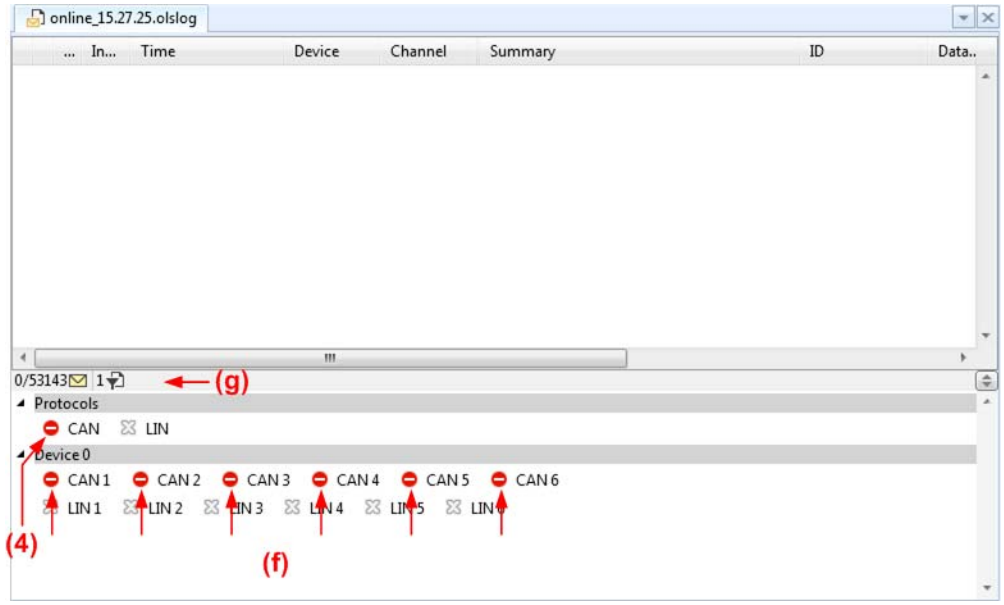

Figure 8.4 Set CAN Protocol Filter

2. Click the **CAN Protocol Filter** **(4)**. All channel Filters of the same protocol type are blocked simultaneously **(f)**. In addition, the Filter counter **(g)** shows that one Filter is enabled (the CAN Protocol Filter). All messages are blocked (number ‘0’ in status bar) as all received messages (number ‘53143’ in status bar) are CAN messages. The Trace View shows no messages.
3. Click one of the **CAN Channel Filters** of **Device 0**. It is not possible. The Channel Filters are disabled as long as the corresponding Protocol Filter is enabled.

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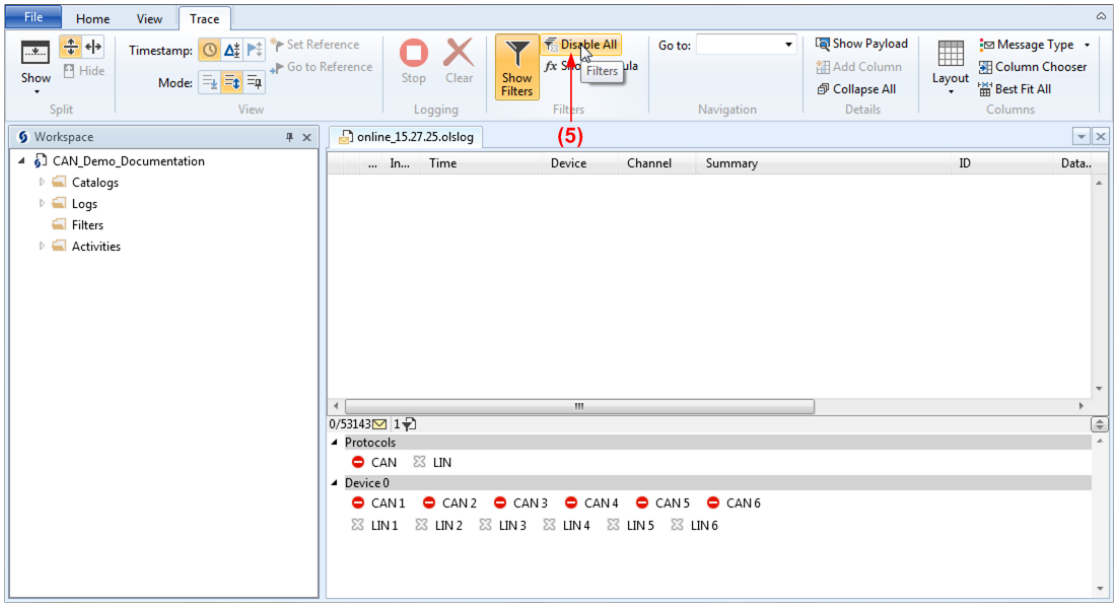

Figure 8.5 Disable All Filters

4. Click **Disable All** (5) in the **Filters** ribbon. All Filters are disabled. The Filter counter in the status bar shows null active filters. The Trace View shows all received messages. The first number in the status bar equals the second number in the status bar.

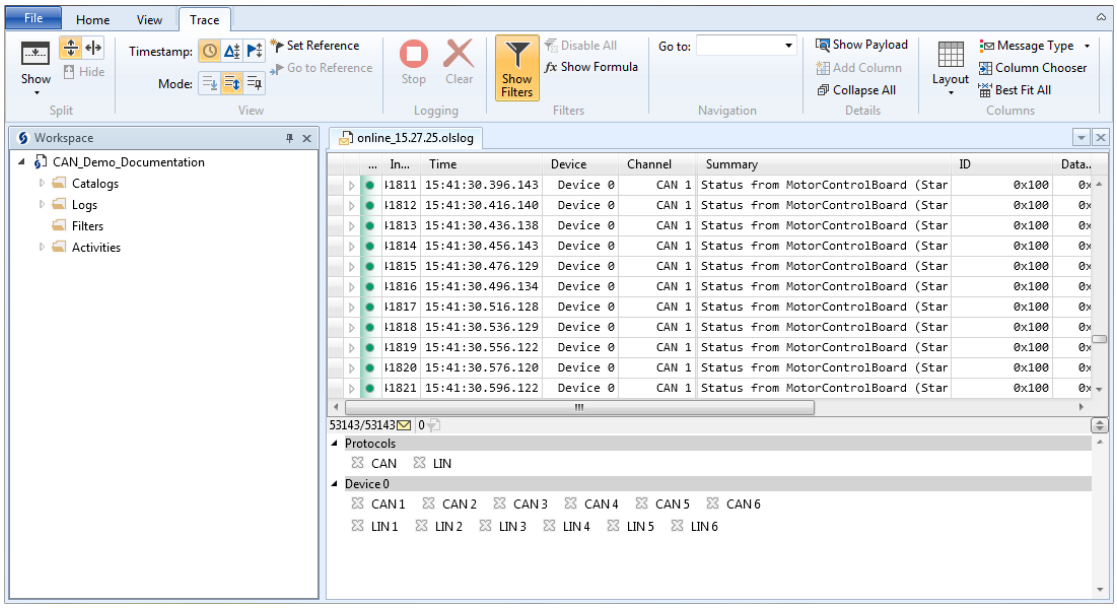

Figure 8.6 Disabled Filters

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8.4 How To Create User Defined Filters

This section describes how to create user defined Filters.

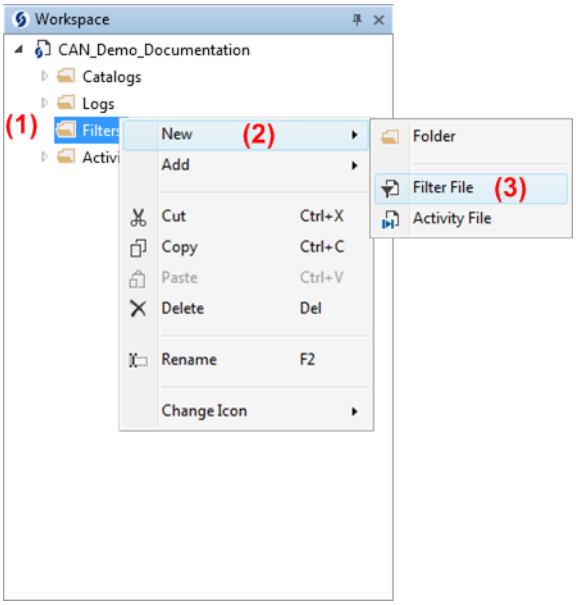

Figure 8.7 Create Filter File

1. In the **Workspace** window, select **Filter** **(1)**, right-click, select **New** **(2)** and then **Filter File** **(3)**. A window opens where the name and the location has to be specified. In the example the **Filter File** name will be **Speed_Greater**. Filter File extension is *.olsfilter.

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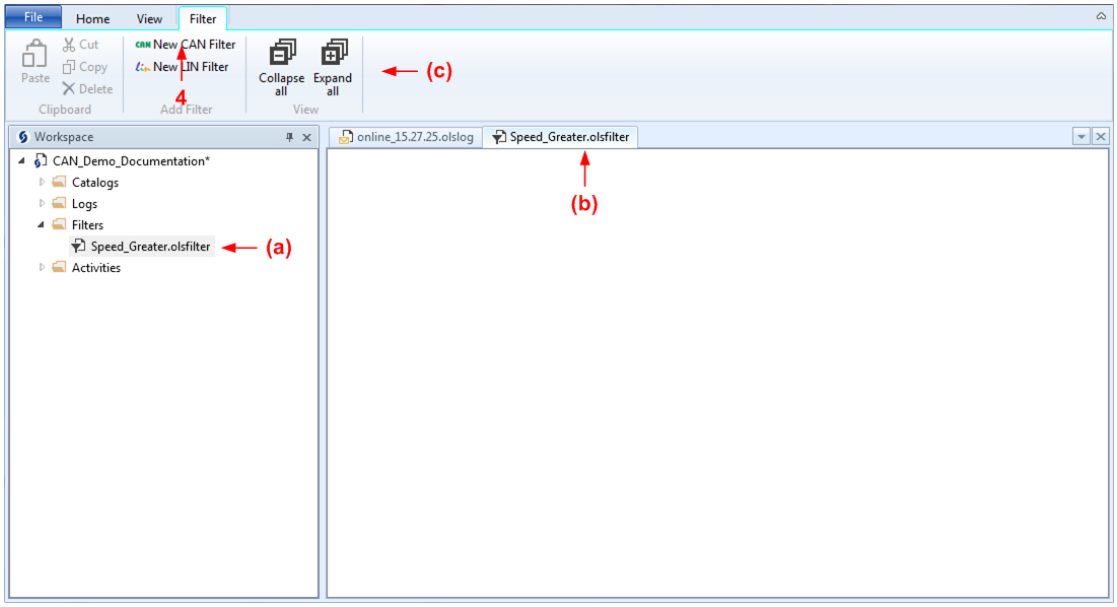

Figure 8.8 Created Filter File

A new Filter File is created **(a)** and automatically opened **(b)**. In addition, the **Filter** ribbon **(b)** is displayed.

2. Click **New CAN Filter** in the **Filter** ribbon **(4)**.

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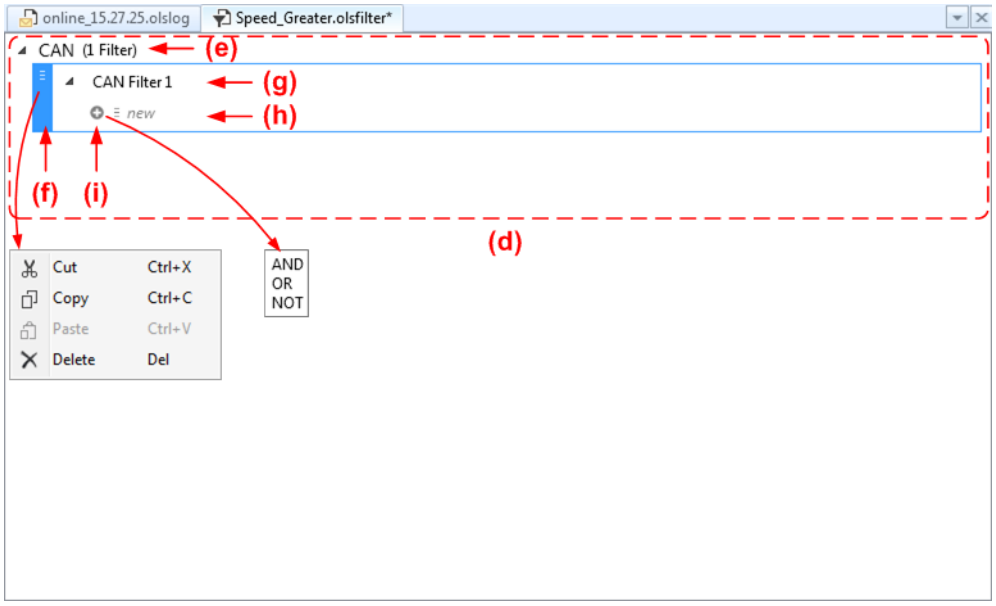

Figure 8.9 Add CAN Filter

A **Filter template** is added **(d)**. An **asterisk** indicates a changed Filter file and that its current content is not stored. The **type** of the Filter (i.e., CAN) is shown at the top **(e)** of the template. In addition, the **amount** of that type is displayed (starting with 1 in the example). A right-click on the **handle** of the Filter **(f)** allows to perform clipboard actions (i.e., cut, copy, paste, delete) depending on the current flow of work. The **name** of the Filter is shown at the top within the blue rectangle **(g)** and can be changed (step 3). In front of the name a small **triangle** allows to collapse or expand the Filter condition. In collapsed mode the entire Filter condition is shown as formula behind the name. Filter conditions can only be specified in expanded view in the row starting with the **plus** sign **(h)**. Clicking on the **plus** sign allows to expand the condition **(i)** according to boolean rules.

There is an alternative how user defined Filter conditions can be created very fast using the drag & drop feature. The procedure is described in Section 8.4.1, "Fast Alternative How To Add a Filter Condition," on page 89.

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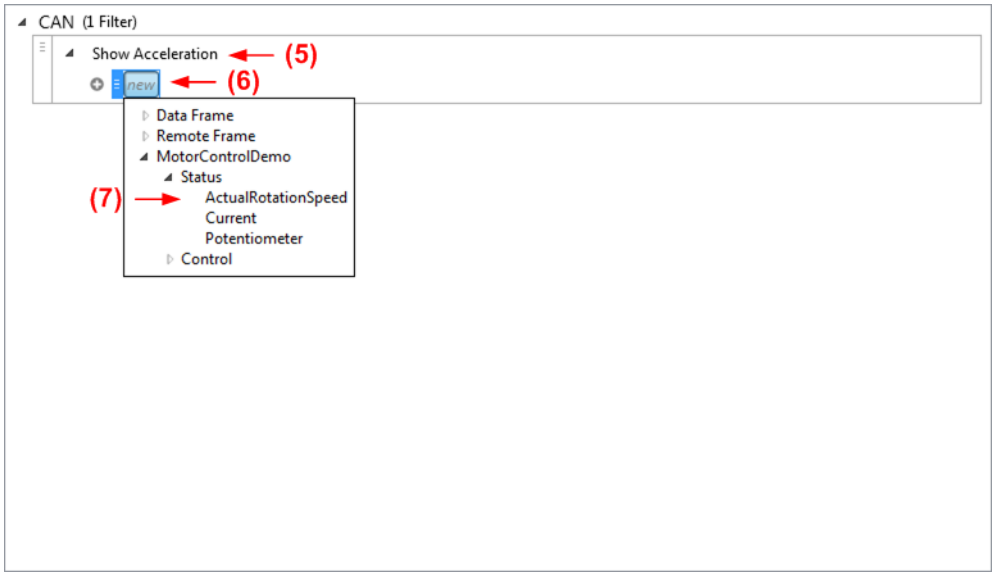

Figure 8.10 Define CAN Filter Condition

3. For example enter as name **Show Acceleration** and press the **Enter** key **(5)**. Afterwards click **new** to open a list of the available operands **(6)**. Expand the Catalog **MotorControlDemo** and select **ActualRotationSpeed** (representing the value of the corresponding signal) **(7)** in section Status. The other entries **Data Frame** and **Remote Frame** are CAN default message properties.

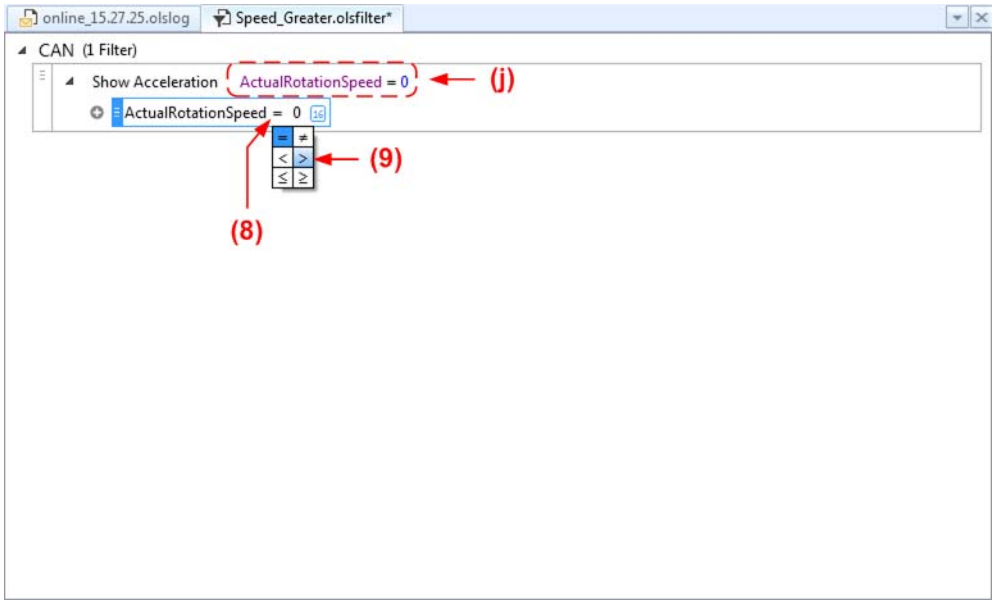

Figure 8.11 Specify Condition - Step 1

4. The current one-row-formula for the Filter is shown behind the name **(j)**. Click on the **Equals** symbol **(8)** and select the **Greater** symbol **(9)**.
5. Click **Save** in the Quick Access Bar to store the current Filter settings.

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In a next step the value has to be specified that will be used as lower limit in the condition. To simplify the following steps the windows will be arranged in a different order.

Figure 8.12 Specify Condition - Step 2

6. Hover the mouse over the **caption** of the Filter file **(10)**.

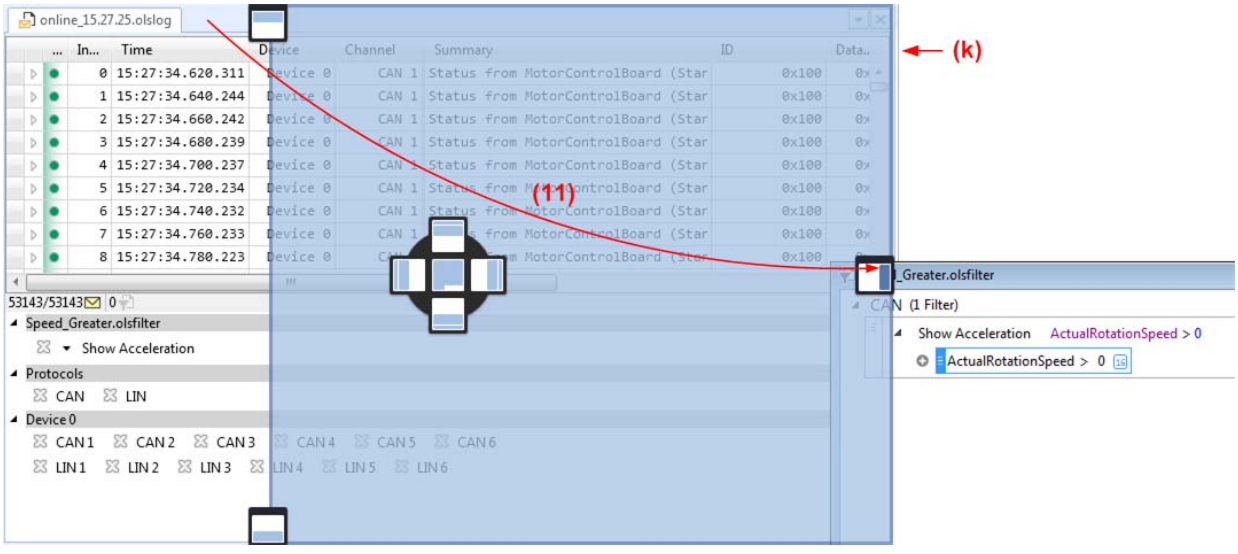

Figure 8.13 Specify Condition - Step 3

7. Click and drag the window **(11)** as shown in Figure 8.13. The blue rectangle **(k)** shows the position of the window within the application when the mouse key is dropped.

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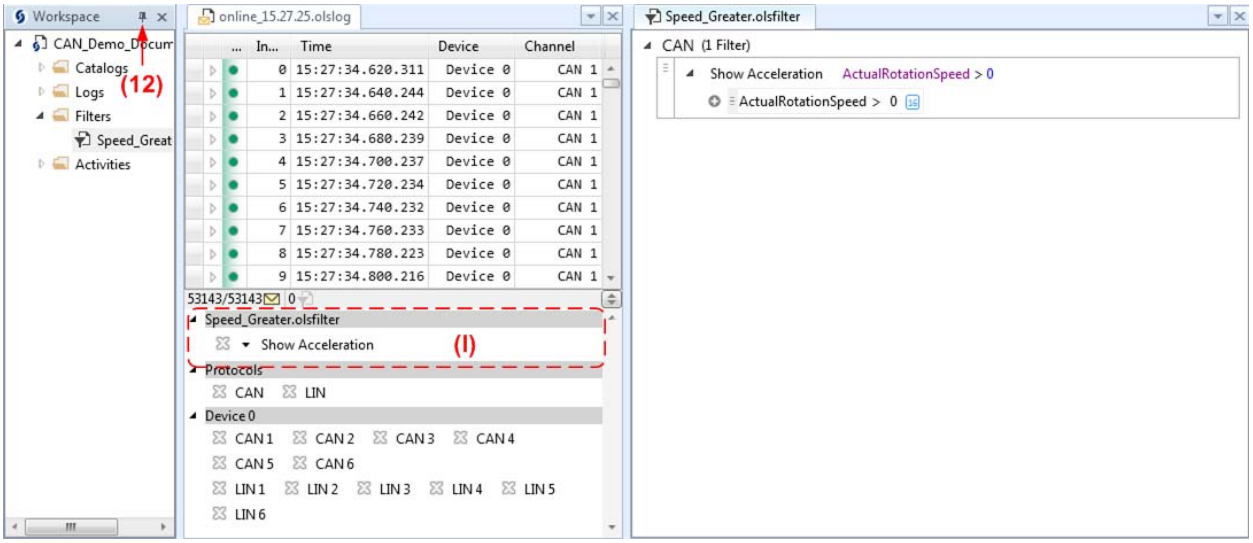

Figure 8.14 Specify Condition - Step 4

The Filter window is arranged to the right side of the Trace View. The current state of the **user defined Filter** is already shown in the Filter section below the Trace View **(I)**. It is disabled by default.

The next action is an optional step that is performed only to enlarge the window of the Trace View within the application and to avoid scrolling in the Trace View.

8. Click **Auto Hide** in the **Workspace** **(12)**.

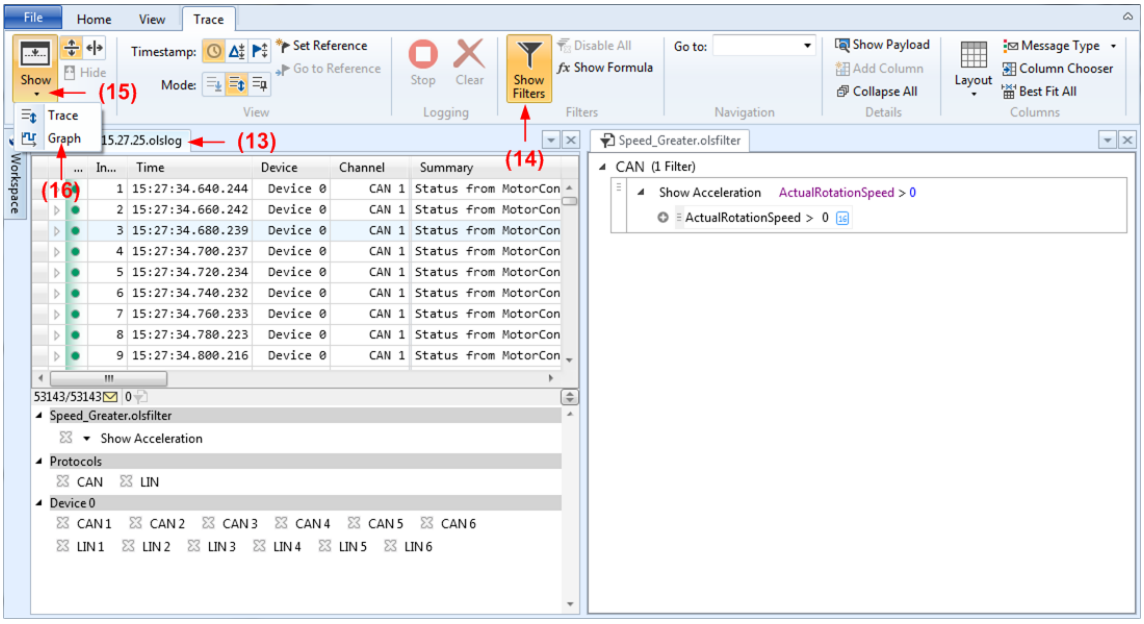

Figure 8.15 Specify Condition - Step 5

The lower limit shall be specified using the Trace View and the Signal Graph (to get a visual impression which value makes sense). This procedure covers step 9 up to step 20 and shows again how you can navigate within OptoLyzer Studio.

9. Click in the **Trace View (13)**. The Trace ribbon is shown. Click **Show Filters (14)** in the Trace ribbon to hide the Filter section below the Trace View.

10. Click **Show (15)** in the Trace ribbon and select **Graph (16)**.

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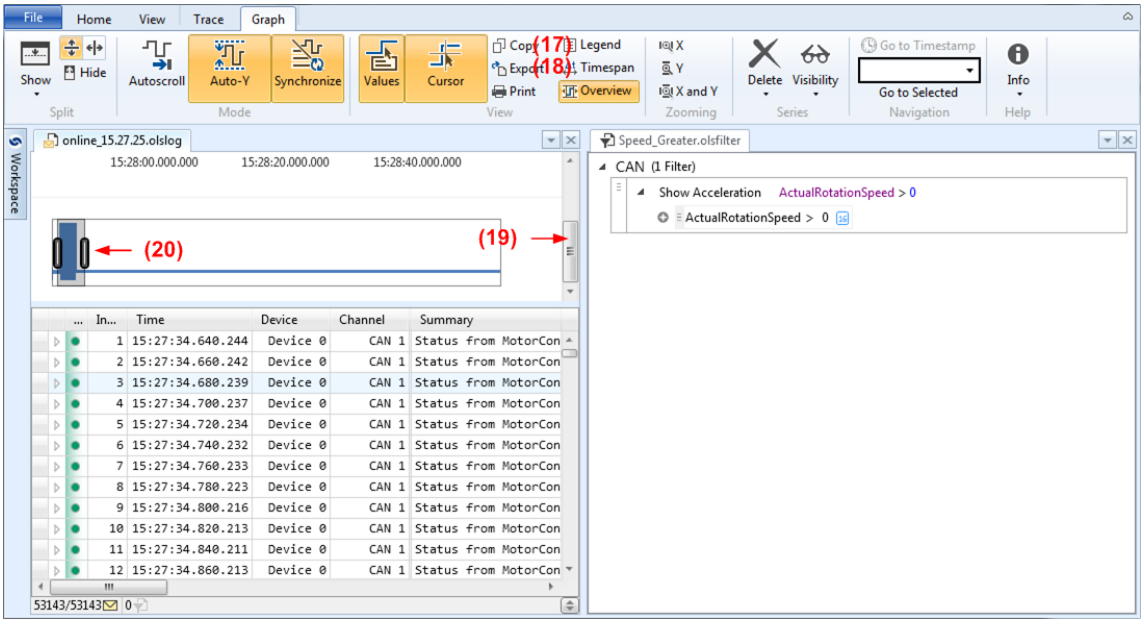

Figure 8.16 Specify Condition - Step 6

11. Click **Legend** **(17)** and **Timespan** **(18)** in the **Graph** ribbon to disable both (target: focus only on Graph and Overview and finding spikes, i.e., interesting values suitable for lower limit) and scroll down to the **Overview** **(19)**.

12. Move the **ViewPort** to the spikes as shown in Figure 8.16 **(20)**.

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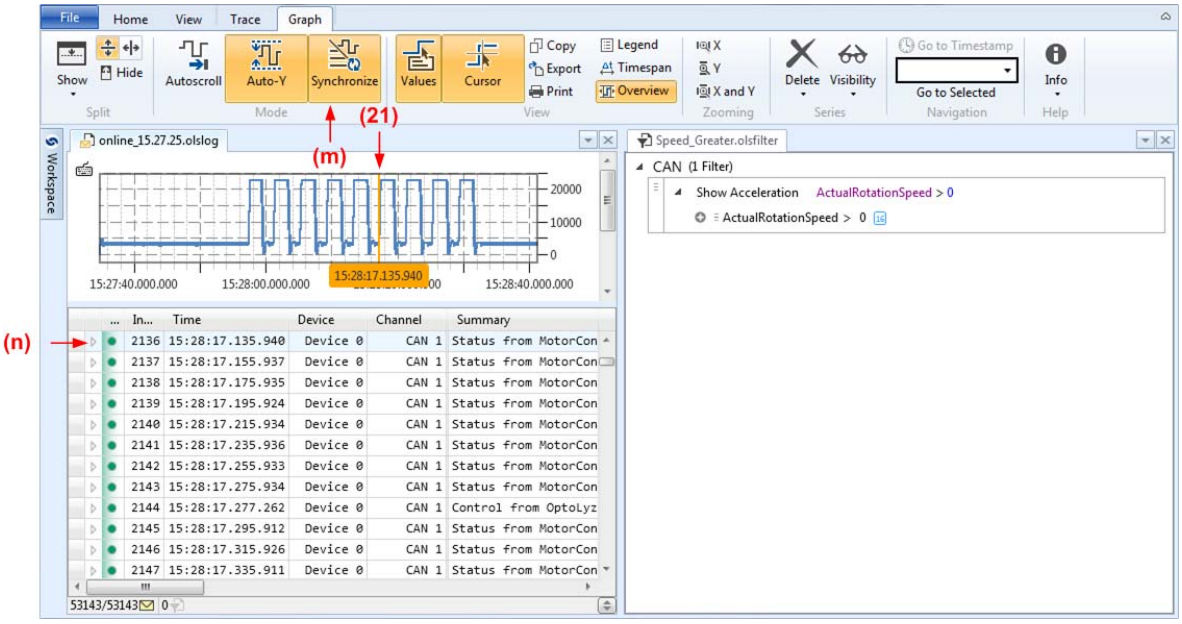

Figure 8.17 Specify Condition - Step 7

13. Ensure **Synchronize (m)** is enabled (i.e., a selected message in the Trace View is shown as a **vertical line** in the Graph highlighted in orange and vice versa **(n)**). Double-click at the start of a ramp **(21)** as shown in Figure 8.17. The double click creates a **vertical line** in the Graph and shows the corresponding highlighted message in the Trace View.

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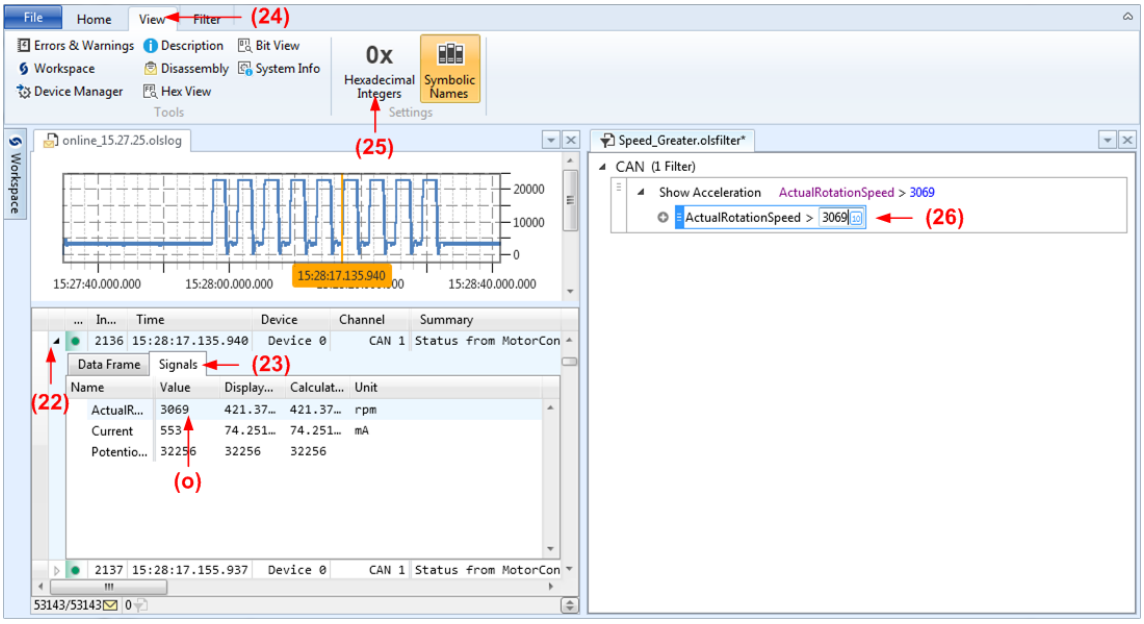

Figure 8.18 Specify Condition - Step 8

14. Click the **small triangle** **(22)** in front of the highlighted message to display the **Detail View**. Switch to the **Signals** tab **(23)**.

15. Select the **View** ribbon **(24)** and disable the **Hexadecimal Integers** button **(25)** (decimal values are shown in the tools). This step ensures the proper values and in the matching numeral system are taken when the lower limit is inserted in the Filter condition. Search for the raw value of **ActualRotationSpeed** **(o)** in the Signal tab of the Detail View and insert this value (3069 as decimal value) in the **Filter condition** **(26)**. Press the **Enter** key.

16. Click **Save** in the Quick Access bar to store the current Filter settings.

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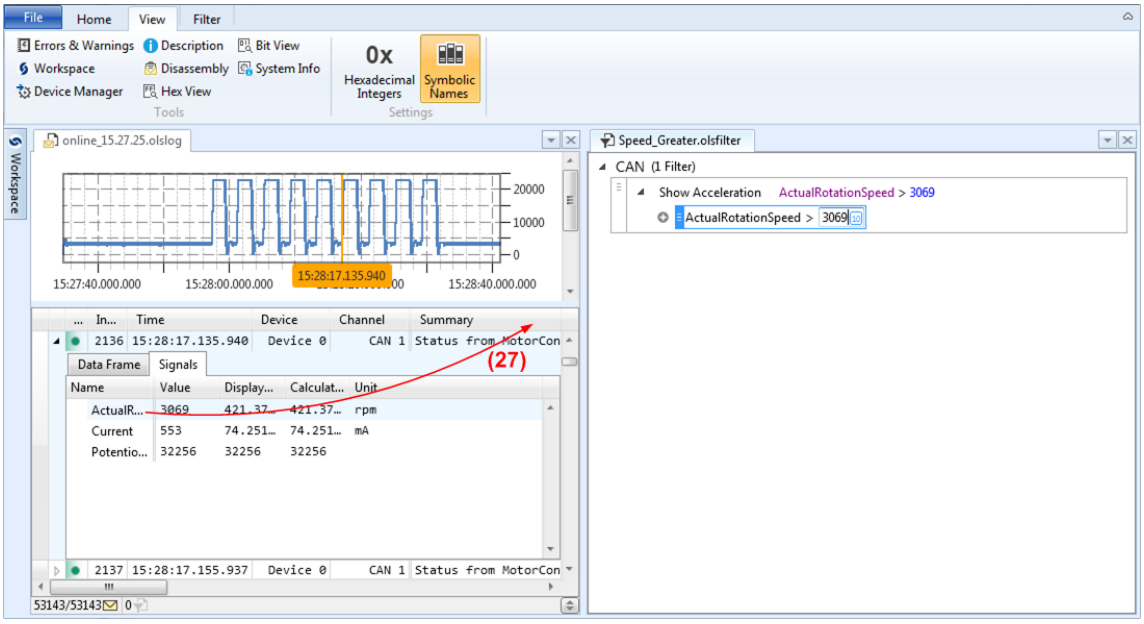

Figure 8.19 Specify Condition - Step 9

17. Select the **ActualRotationSpeed** in the **Detail View** and drag it to the **Trace View (27)** as shown in Figure 8.19. This step is performed to view and control the values in the Trace View later.
18. Close the **Filter File**.
19. Collapse the **Detail View** in the Trace View.
20. Click **Hide** in the Trace ribbon to close the Graph.
21. Click **Show Filters** in the Trace ribbon.

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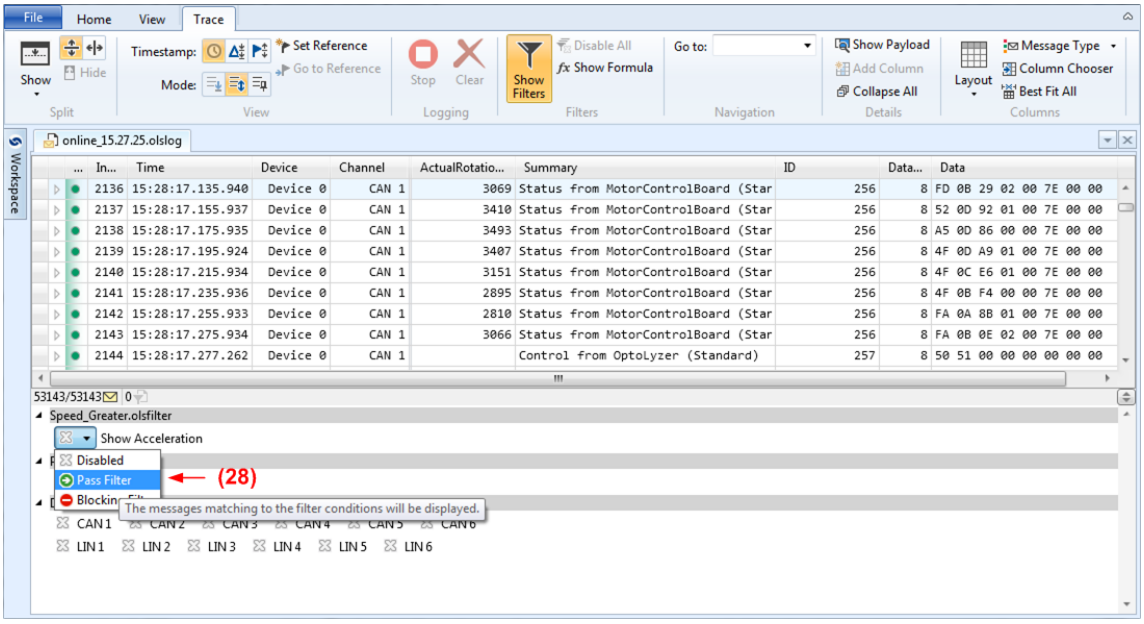
File
Home
View
Trace
Show
Hide
Split
Timestamp:
Mode:
Set Reference
Go to Reference
View
Stop
Clear
Logging
Show Filters
Disable All
Show Formula
Filters
Go to:
Navigation
Show Payload
Add Column
Collapse All
Details
Layout
Message Type
Column Chooser
Best Fit All
Columns
Workspace
online_15.27.25.olslog
... In... Time Device Channel ActualRotatio... Summary ID Data... Data
2136 15:28:17.135.940 Device 0 CAN 1 3069 Status from MotorControlBoard (Star 256 8 FD 0B 29 02 00 7E 00 00
2137 15:28:17.155.937 Device 0 CAN 1 3410 Status from MotorControlBoard (Star 256 8 52 0D 92 01 00 7E 00 00
2138 15:28:17.175.935 Device 0 CAN 1 3493 Status from MotorControlBoard (Star 256 8 A5 0D 86 00 00 7E 00 00
2139 15:28:17.195.924 Device 0 CAN 1 3407 Status from MotorControlBoard (Star 256 8 4F 0D A9 01 00 7E 00 00
2140 15:28:17.215.934 Device 0 CAN 1 3151 Status from MotorControlBoard (Star 256 8 4F 0C E6 01 00 7E 00 00
2141 15:28:17.235.936 Device 0 CAN 1 2895 Status from MotorControlBoard (Star 256 8 4F 0B F4 00 00 7E 00 00
2142 15:28:17.255.933 Device 0 CAN 1 2810 Status from MotorControlBoard (Star 256 8 FA 0A 8B 01 00 7E 00 00
2143 15:28:17.275.934 Device 0 CAN 1 3066 Status from MotorControlBoard (Star 256 8 FA 0B 0E 02 00 7E 00 00
2144 15:28:17.277.262 Device 0 CAN 1 Control from OptoLyzer (Standard) 257 8 50 51 00 00 00 00 00 00
53143/53143 0
Speed_Greater.olsfilter
Show Acceleration
Disabled
Pass Filter
(28)
The messages matching to the filter conditions will be displayed.
CAN 1 CAN 2 CAN 3 CAN 4 CAN 5 CAN 6
LIN 1 LIN 2 LIN 3 LIN 4 LIN 5 LIN 6

Figure 8.20 Specify Condition - Step 10

22. Click the **triangle** in front of the user defined Filter and select **Pass Filter (28)**.

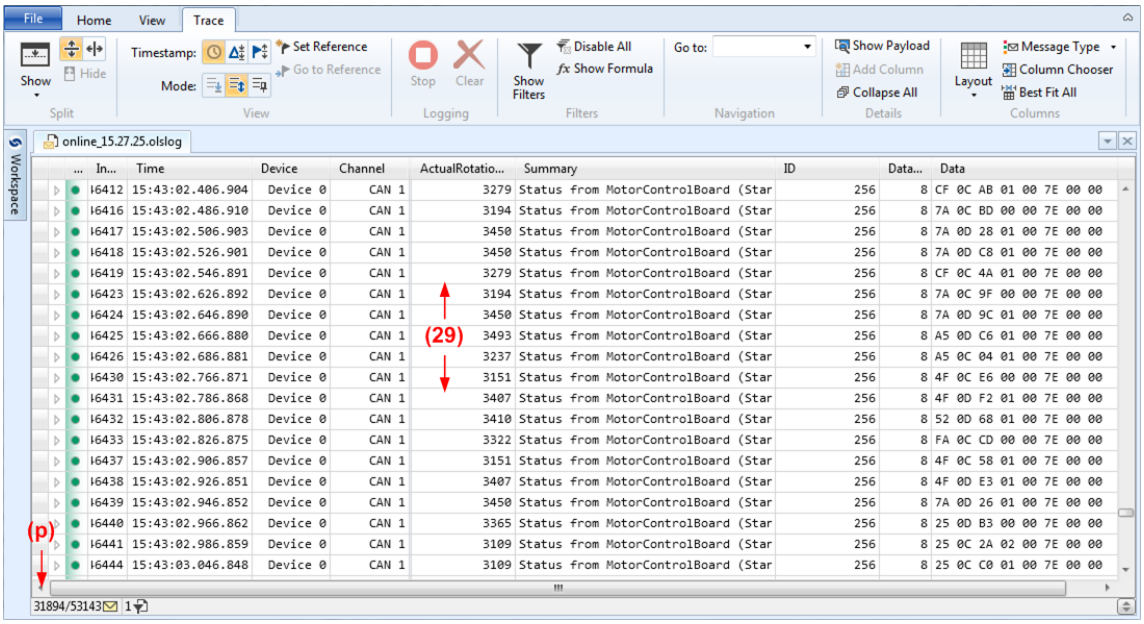
File
Home
View
Trace
Show
Hide
Split
Timestamp:
Mode:
Set Reference
Go to Reference
View
Stop
Clear
Logging
Show Filters
Disable All
Show Formula
Filters
Go to:
Navigation
Show Payload
Add Column
Collapse All
Details
Layout
Message Type
Column Chooser
Best Fit All
Columns
Workspace
online_15.27.25.olslog
... In... Time Device Channel ActualRotatio... Summary ID Data... Data
I6412 15:43:02.406.904 Device 0 CAN 1 3279 Status from MotorControlBoard (Star 256 8 CF 0C AB 01 00 7E 00 00
I6416 15:43:02.486.910 Device 0 CAN 1 3194 Status from MotorControlBoard (Star 256 8 7A 0C BD 00 00 7E 00 00
I6417 15:43:02.506.903 Device 0 CAN 1 3450 Status from MotorControlBoard (Star 256 8 7A 0D 28 01 00 7E 00 00
I6418 15:43:02.526.901 Device 0 CAN 1 3450 Status from MotorControlBoard (Star 256 8 7A 0D C8 01 00 7E 00 00
I6419 15:43:02.546.891 Device 0 CAN 1 3279 Status from MotorControlBoard (Star 256 8 CF 0C 4A 01 00 7E 00 00
I6423 15:43:02.626.892 Device 0 CAN 1 3194 Status from MotorControlBoard (Star 256 8 7A 0C 9F 00 00 7E 00 00
I6424 15:43:02.646.890 Device 0 CAN 1 3450 Status from MotorControlBoard (Star 256 8 7A 0D 9C 01 00 7E 00 00
I6425 15:43:02.666.880 Device 0 CAN 1 3493 Status from MotorControlBoard (Star 256 8 A5 0D C6 01 00 7E 00 00
I6426 15:43:02.686.881 Device 0 CAN 1 3237 Status from MotorControlBoard (Star 256 8 A5 0C 04 01 00 7E 00 00
I6430 15:43:02.766.871 Device 0 CAN 1 3151 Status from MotorControlBoard (Star 256 8 4F 0C E6 00 00 7E 00 00
I6431 15:43:02.786.868 Device 0 CAN 1 3407 Status from MotorControlBoard (Star 256 8 4F 0D F2 01 00 7E 00 00
I6432 15:43:02.806.878 Device 0 CAN 1 3410 Status from MotorControlBoard (Star 256 8 52 0D 68 01 00 7E 00 00
I6433 15:43:02.826.875 Device 0 CAN 1 3322 Status from MotorControlBoard (Star 256 8 FA 0C CD 00 00 7E 00 00
I6437 15:43:02.906.857 Device 0 CAN 1 3151 Status from MotorControlBoard (Star 256 8 4F 0C 58 01 00 7E 00 00
I6438 15:43:02.926.851 Device 0 CAN 1 3407 Status from MotorControlBoard (Star 256 8 4F 0D E3 01 00 7E 00 00
I6439 15:43:02.946.852 Device 0 CAN 1 3450 Status from MotorControlBoard (Star 256 8 7A 0D 26 01 00 7E 00 00
I6440 15:43:02.966.862 Device 0 CAN 1 3365 Status from MotorControlBoard (Star 256 8 25 0D B3 00 00 7E 00 00
I6441 15:43:02.986.859 Device 0 CAN 1 3109 Status from MotorControlBoard (Star 256 8 25 0C 2A 02 00 7E 00 00
I6444 15:43:03.046.848 Device 0 CAN 1 3109 Status from MotorControlBoard (Star 256 8 25 0C C0 01 00 7E 00 00
(29)
(p)
31894/53143 1

Figure 8.21 Check Values

23. The Filter is effective immediately **(p)**. Hide the Filters, i.e., click **Show Filters** in the Trace ribbon to enlarge the area for the Trace View. Scroll within the Trace View and check the values of **ActualRotationSpeed (29)**. Only values are visible that are greater than 3069 (decimal value).

Other user defined Filters can be created in the same way as described above or maybe faster as shown in Section 8.4.1.

8.4.1 Fast Alternative How To Add a Filter Condition

1. Open the Details View in the Trace View and switch to the Signal tab.

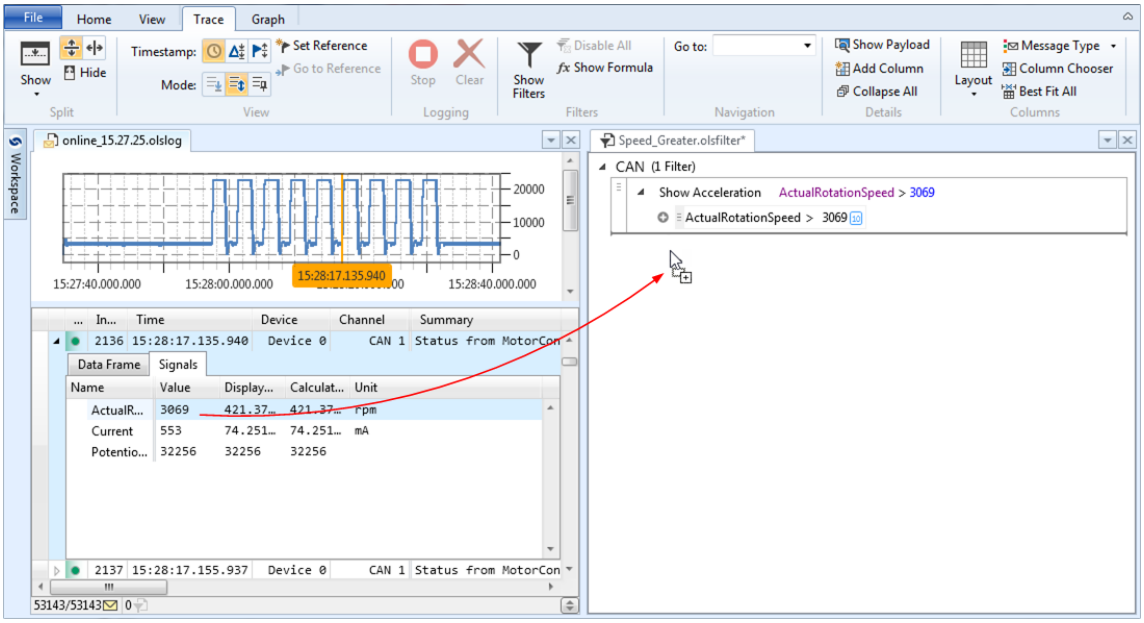

Figure 8.22 Specify Condition by Drag & Drop

2. Select the **ActualRotationSpeed** and drag & drop it to the Filter file.
3. Adapt the value in the filter formula if desired.

Notes: The message can be copied in the same way from the Disassembly and the Trace View.

Chapter 9 Digging in Bits and Bytes

The OptoLyzer Studio provides tools that allow digging deeper on bit and byte level. Thus data can be analyzed in detail. The following tools are provided:

- Disassembly
- Bit View
- Hex View

The sample below is basing on the same example environment as described in Figure 4.1 Example Environment on page 21. In addition, it is assumed that the steps described in Chapter 8, "Creating Filters," on page 70 are performed.

9.1 Disassembly

This tool displays the selected message disassembly in a user friendly way in five columns:

- Property Name
- Value: showing the raw value that is transmitted over the bus system
- Display Value: showing user friendly value according to user settings (e.g., hexadecimal/decimal) and presented, e.g., in the Trace View
- Calculated Value: using meta information in Catalogs
- Unit: the physical unit of the value if available in Catalogs

If no Catalog is available, the payload is displayed either in hexadecimal, decimal or ASCII style. Display Values are displayed dependent on the settings of Hexadecimal Integer and Symbolic Names in the View ribbon. Hovering over the property names shows a tool tip with description if available.

Notes: The Disassembly shall be experienced as a unit together with the Trace View. This means it makes sense to open both tools in the Workspace. Data in the Disassembly can be found in the Trace View and vice versa. However data is presented more user-friendly within Disassembly. Scrolling (i.e., selecting messages consecutively) in the Trace View will automatically update the data in the Disassembly.

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9.1.1 How To Use the Disassembly

To start the Disassembly follow these steps.

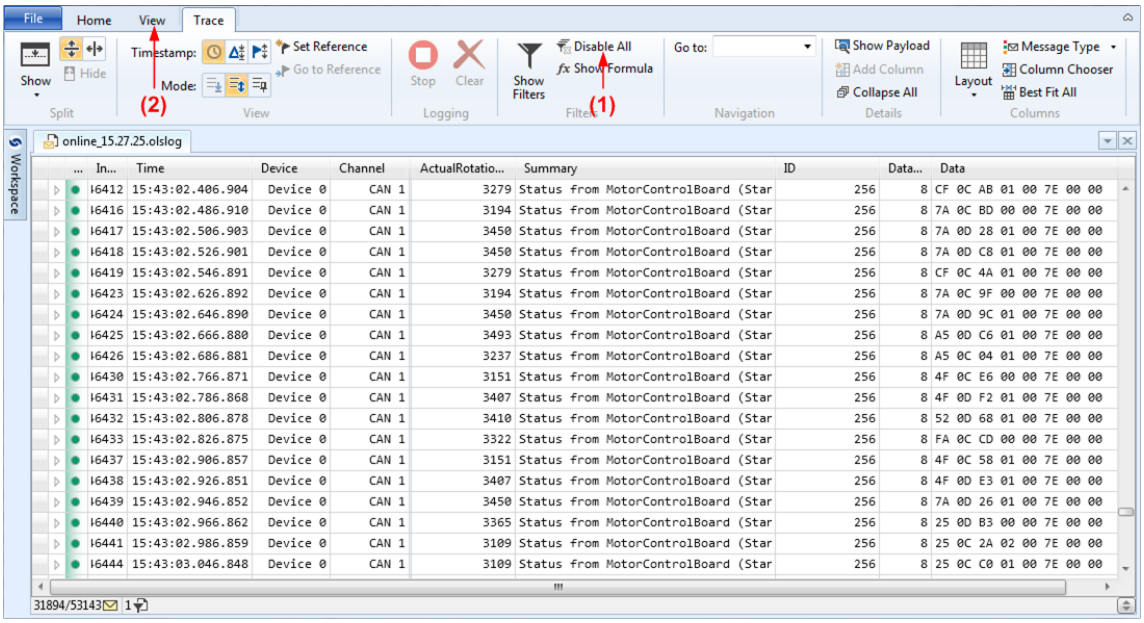
File
Home
View
Trace
Show
Hide
Split
Timestamp:
Mode:
Set Reference
Go to Reference
View
(2)
Stop
Clear
Logging
Show Filters
Disable All
Show Formula
Filter
(1)
Go to:
Navigation
Show Payload
Add Column
Collapse All
Details
Layout
Message Type
Column Chooser
Best Fit All
Columns
Workspace
online_15.27.25.olslog
... In... Time Device Channel ActualRotatio... Summary ID Data... Data
I6412 15:43:02.406.904 Device 0 CAN 1 3279 Status from MotorControlBoard (Star 256 8 CF 0C AB 01 00 7E 00 00
I6416 15:43:02.486.910 Device 0 CAN 1 3194 Status from MotorControlBoard (Star 256 8 7A 0C BD 00 00 7E 00 00
I6417 15:43:02.506.903 Device 0 CAN 1 3450 Status from MotorControlBoard (Star 256 8 7A 0D 28 01 00 7E 00 00
I6418 15:43:02.526.901 Device 0 CAN 1 3450 Status from MotorControlBoard (Star 256 8 7A 0D C8 01 00 7E 00 00
I6419 15:43:02.546.891 Device 0 CAN 1 3279 Status from MotorControlBoard (Star 256 8 CF 0C 4A 01 00 7E 00 00
I6423 15:43:02.626.892 Device 0 CAN 1 3194 Status from MotorControlBoard (Star 256 8 7A 0C 9F 00 00 7E 00 00
I6424 15:43:02.646.890 Device 0 CAN 1 3450 Status from MotorControlBoard (Star 256 8 7A 0D 9C 01 00 7E 00 00
I6425 15:43:02.666.880 Device 0 CAN 1 3493 Status from MotorControlBoard (Star 256 8 A5 0D C6 01 00 7E 00 00
I6426 15:43:02.686.881 Device 0 CAN 1 3237 Status from MotorControlBoard (Star 256 8 A5 0C 04 01 00 7E 00 00
I6430 15:43:02.766.871 Device 0 CAN 1 3151 Status from MotorControlBoard (Star 256 8 4F 0C E6 00 00 7E 00 00
I6431 15:43:02.786.868 Device 0 CAN 1 3407 Status from MotorControlBoard (Star 256 8 4F 0D F2 01 00 7E 00 00
I6432 15:43:02.806.878 Device 0 CAN 1 3410 Status from MotorControlBoard (Star 256 8 52 0D 68 01 00 7E 00 00
I6433 15:43:02.826.875 Device 0 CAN 1 3322 Status from MotorControlBoard (Star 256 8 FA 0C CD 00 00 7E 00 00
I6437 15:43:02.906.857 Device 0 CAN 1 3151 Status from MotorControlBoard (Star 256 8 4F 0C 58 01 00 7E 00 00
I6438 15:43:02.926.851 Device 0 CAN 1 3407 Status from MotorControlBoard (Star 256 8 4F 0D E3 01 00 7E 00 00
I6439 15:43:02.946.852 Device 0 CAN 1 3450 Status from MotorControlBoard (Star 256 8 7A 0D 26 01 00 7E 00 00
I6440 15:43:02.966.862 Device 0 CAN 1 3365 Status from MotorControlBoard (Star 256 8 25 0D B3 00 00 7E 00 00
I6441 15:43:02.986.859 Device 0 CAN 1 3109 Status from MotorControlBoard (Star 256 8 25 0C 2A 02 00 7E 00 00
I6444 15:43:03.046.848 Device 0 CAN 1 3109 Status from MotorControlBoard (Star 256 8 25 0C C0 01 00 7E 00 00
31894/53143
1

Figure 9.1 Start Disassembly- Step 1

1. Starting from Figure 8.21 on page 88 click **Disable All** **(1)** in the **Trace View** to disable all Filters. Then switch to the **View** ribbon **(2)**.

Figure 9.2 Start Disassembly- Step 2

2. Click **Disassembly** **(3)** in the View ribbon. The Disassembly is opened.

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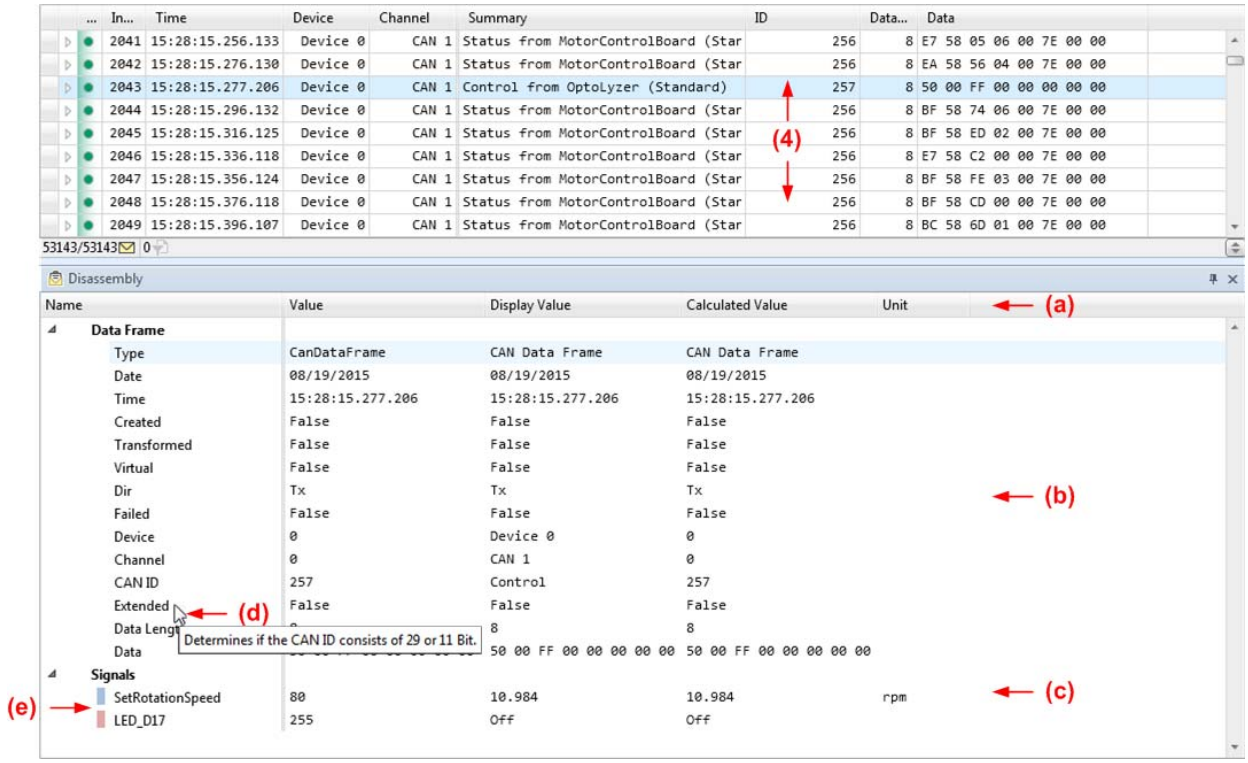
...
In...
Time
Device
Channel
Summary
ID
Data...
Data
2041 15:28:15.256.133 Device 0 CAN 1 Status from MotorControlBoard (Star 256 8 E7 58 05 06 00 7E 00 00
2042 15:28:15.276.130 Device 0 CAN 1 Status from MotorControlBoard (Star 256 8 EA 58 56 04 00 7E 00 00
2043 15:28:15.277.206 Device 0 CAN 1 Control from OptoLyzer (Standard) 257 8 50 00 FF 00 00 00 00 00
2044 15:28:15.296.132 Device 0 CAN 1 Status from MotorControlBoard (Star 256 8 BF 58 74 06 00 7E 00 00
2045 15:28:15.316.125 Device 0 CAN 1 Status from MotorControlBoard (Star 256 8 BF 58 ED 02 00 7E 00 00
2046 15:28:15.336.118 Device 0 CAN 1 Status from MotorControlBoard (Star 256 8 E7 58 C2 00 00 7E 00 00
2047 15:28:15.356.124 Device 0 CAN 1 Status from MotorControlBoard (Star 256 8 BF 58 FE 03 00 7E 00 00
2048 15:28:15.376.118 Device 0 CAN 1 Status from MotorControlBoard (Star 256 8 BF 58 CD 00 00 7E 00 00
2049 15:28:15.396.107 Device 0 CAN 1 Status from MotorControlBoard (Star 256 8 BC 58 6D 01 00 7E 00 00
(4)
53143/53143
0
Disassembly
Name
Value
Display Value
Calculated Value
Unit
(a)
Data Frame
Type CanDataFrame CAN Data Frame CAN Data Frame
Date 08/19/2015 08/19/2015 08/19/2015
Time 15:28:15.277.206 15:28:15.277.206 15:28:15.277.206
Created False False False
Transformed False False False
Virtual False False False
Dir Tx Tx Tx
(b)
Failed False False False
Device 0 Device 0 0
Channel 0 CAN 1 0
CAN ID 257 Control 257
Extended False False False
(d)
Data Length 8 8
Determines if the CAN ID consists of 29 or 11 Bit.
Data 50 00 FF 00 00 00 00 00 50 00 FF 00 00 00 00 00
Signals
(e)
SetRotationSpeed 80 10.984 10.984 rpm
(c)
LED_D17 255 Off Off

Figure 9.3 View Data in Disassembly

3. Figure 9.3 shows the hierarchical View with **headers** (5 columns **(a)**), **Data Frame (b)** and **payload (c)** properties. In opposite to the Trace View the Disassembly shows all values of a message. Depending on whether a Catalog is loaded or not parts of the Data Frame and the payload are presented user friendly. Hovering over the property names shows a **tool tip (d)** with description if available. The Signals are identified by **specific colors (e)** that can also be found in the Bit Editor Section 9.2, "Bit View," on page 93).
4. Select a message within the **Trace View (4)** and press the **cursor up** or **cursor down** key. Monitor how the data changes accordingly in the Disassembly.
5. Click **Hexadecimal Integers** in the **View** ribbon to switch between hexadecimal and decimal presentation. View how the values change.
6. Click **Symbolic Names** in the **View** ribbon to show names instead of values and vice versa. It is specified in the Catalog which values are shown as names. View how the values change.

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9.2 Bit View

This tool displays dump information of a message on bit and byte level. Section 9.2.2, "Recommendation when To Use the Bit View," on page 96 shows an example when it makes sense to use the Bit View.

9.2.1 How To Use the Bit View

To start the Bit View follow these steps.

Figure 9.4 Start Bit View

1. Starting from Figure 9.3 on page 92 switch to the **View** ribbon if necessary and click **Bit View (1)**. The Bit View is opened and arranged next to the Disassembly at the bottom by default. You can arrange the windows in a different order if desired (refer to Figure 8.13 Specify Condition - Step 3 on page 81).

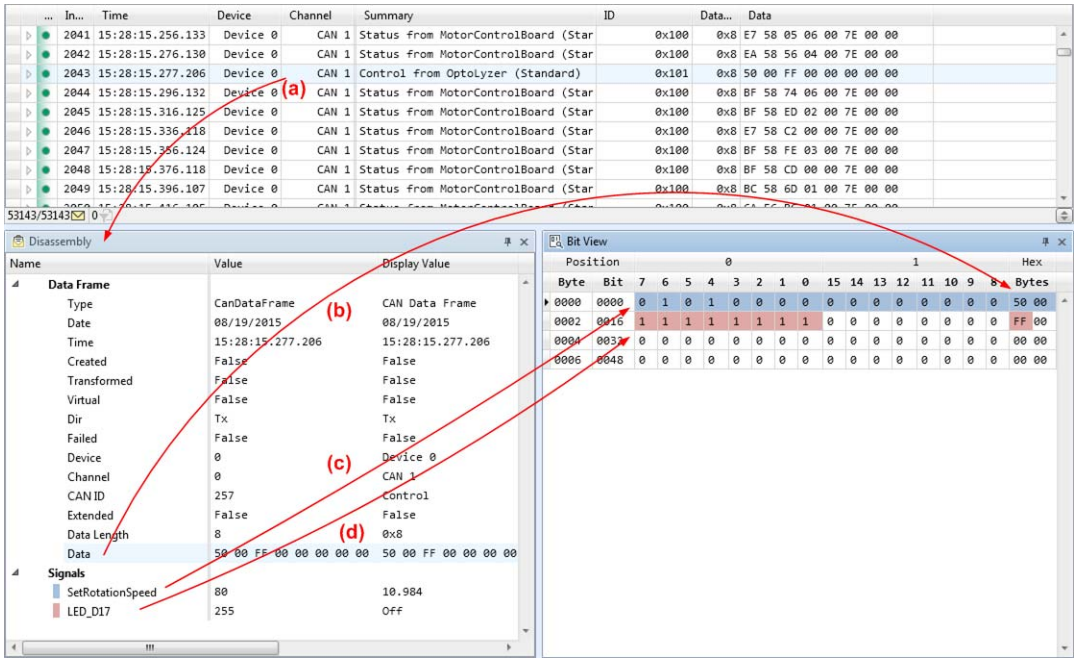

Figure 9.5 How Information Is Spread within the Tools 1

Figure 9.5 shows how information is spread within the tools and which details can be found where. The example above shows that all details of a message selected in the Trace View are presented in the Disassembly **(a)**. If you want to know where the signals of a message start within the byte chain, switch to the Bit View **(b)**. In addition, it shows the bit values for the single signals **(c)**, **(d)**. Keep in mind that the signals in the Disassembly and Bit View are presented in the same color. The hexadecimal values of the bytes are shown at the right side in the Bit View. They match the byte sequence in the Disassembly.

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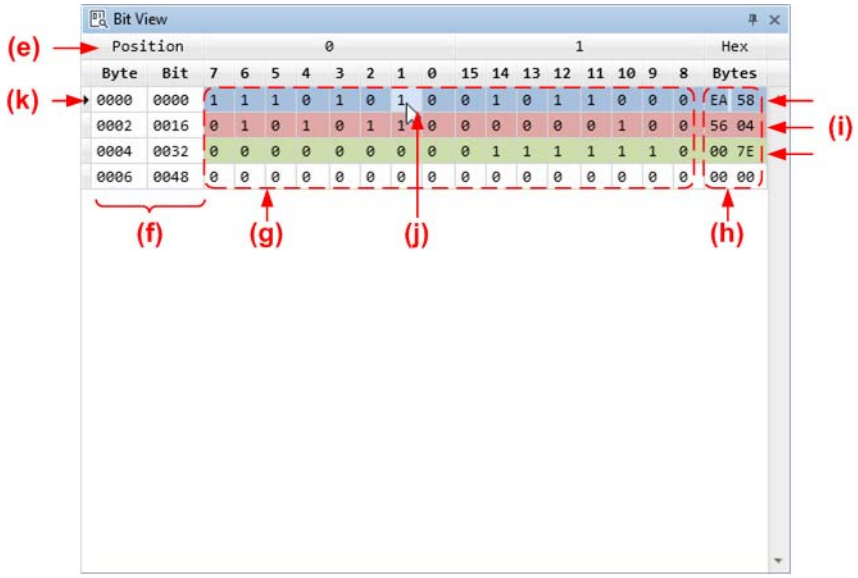

Figure 9.6 Bit View - Details

The Figure 9.6 shows a different message selection in the Trace View and how this message looks like in the Bit View.

The header shows the position of the bytes **(e)** within a message (little endian byte order). The sequence of the bits and bytes are shown on the left side **(f)**. The single bit values **(g)** of the signals are arranged in the middle of the Bit View. At the right side the hexadecimal values of the bytes are shown **(h)**. Each signal is presented in its own specific color **(i)** using the same color as in the Disassembly. These colors help to find the respective signals in the Disassembly. Selecting a signal in the Disassembly automatically selects the respective bits and bytes in the Bit View. OptoLyzer Studio automatically assigns the colors to the signals (Disassembly) and bits and bytes (Bit View). If a bit is selected within the Bit View, this bit is displayed in a specific color indicating the current selection **(j)** (one bit or several bits can be selected). A small triangle shows in which row of the dump the bit selection starts **(k)**.

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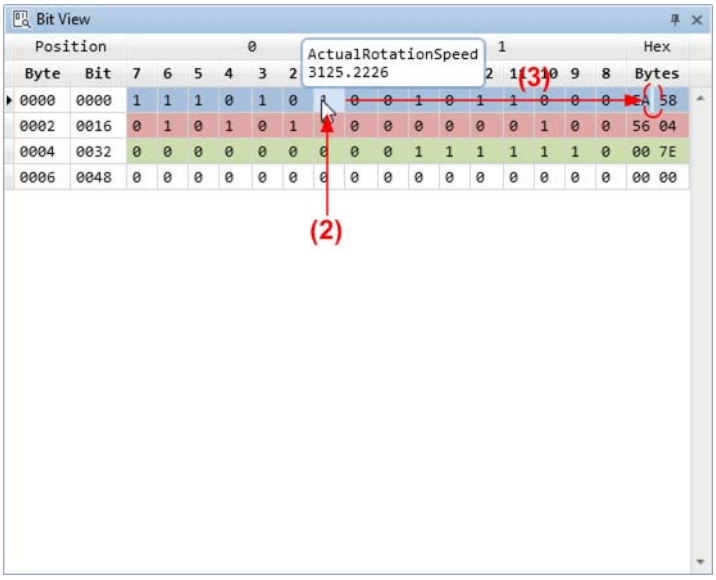

Figure 9.7 Bit View - Tool Tip

2. Hover over a byte sequence of the same color that is not white. The **tool tip (2)** presents the name of the signal and its value.
3. Select a bit and let the eyes wander to the right side **(3)** where the hexadecimal byte values are arranged. The **selection** is also shown in the Bytes area.

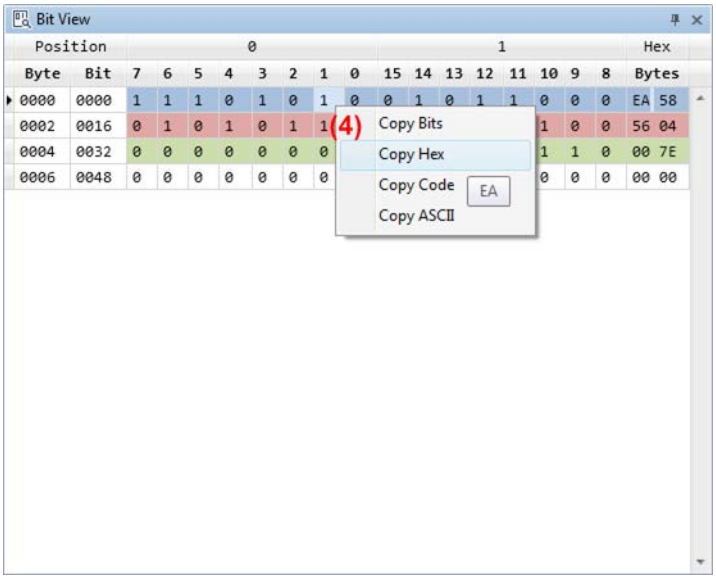

Figure 9.8 Bit View - Select Bit

4. Again select a bit and right-click **(4)**. A **context menu** opens. The bit value is shown and can be copied for further use. **Hover** over the other items in the list to view the value as bit, hex, code or ASCII value.

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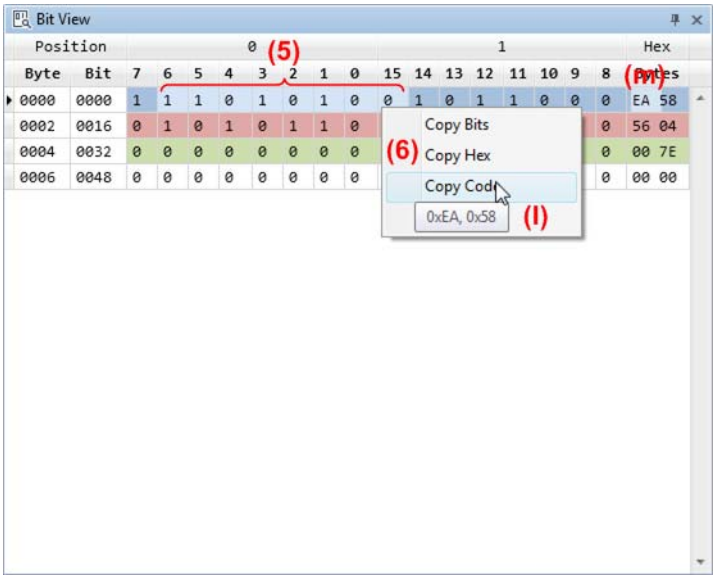

Figure 9.9 Bit View - Copy Data

5. Now **select a bit** and **drag the cursor** to the right side as shown above **(5)**. **Right-click (6)** and view the **value (l)**. View the indication of the selection in the **bytes area (m)**.

9.2.2 Recommendation when To Use the Bit View

The Bit View is the appropriate tool to view details when you are monitoring short messages as CAN (e.g., 8 bytes) or LIN messages and/or if the signals do not start with the first bit (i.e., bit 0) of a byte, i.e., if one byte covers content of different signals or do not end with the last bit of a byte. Figure 9.9 shows an example.

Figure 9.10 Byte - Split Information

Byte 1 covers parts of two signals. The bits 8 up to 13 belong to one signal whereas the bits 14 and 15 belong to a different signal. Both signals are indicated by different colors. The different ranges within the byte (Hex Byte range on the right side) are also indicated by different colors.

9.3 Hex View

This tool displays the hexadecimal bytes of a message. Section 9.3.2, "Recommendation when To Use the Hex View," on page 99 provides hints about for which protocol types it makes sense to use the Hex View.

9.3.1 How To Use the Hex View

To start the Hex View follow these steps.

Figure 9.11 Start Hex View

1. Starting from Figure 9.5 on page 93 switch to the View ribbon if necessary and click **Hex View (1)**. The Hex View is opened and arranged next to the Bit View at the bottom.

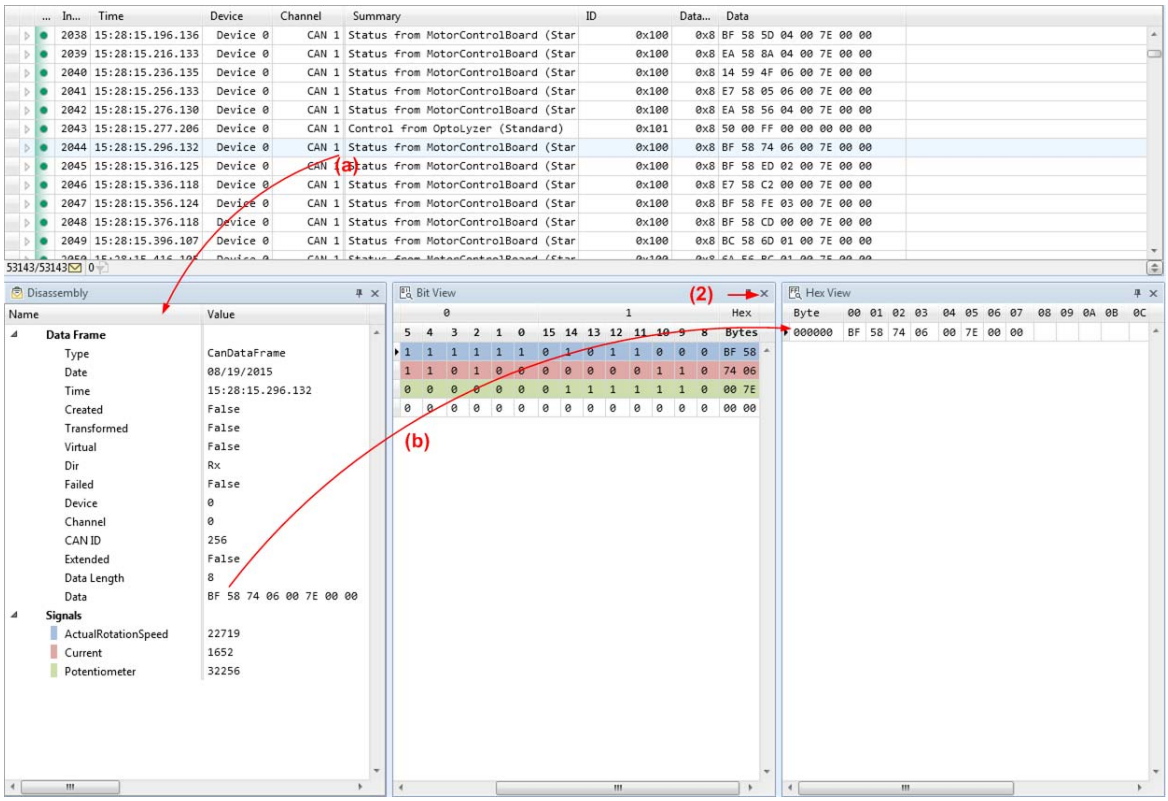

Figure 9.12 How Information Is Spread within the Tools 2

Figure 9.12 shows how information is spread between Trace View, Disassembly and Hex View and how details can be found. The example above shows that all details of a message selected in the Trace View are presented in the Disassembly **(a)**. If you want to focus on the hexadecimal values, switch to the Hex View **(b)**.

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2. Close the **Bit View** **(2)** to focus on the Hex View.

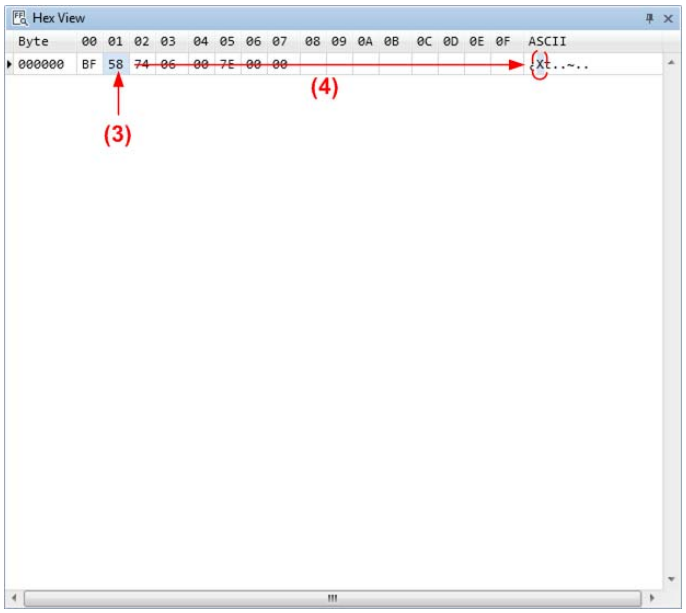

Figure 9.13 Hex View - Select Byte

3. Select a **byte** **(3)** and let the eyes wander to the right side **(4)** where the corresponding ASCII values are arranged. The selected ASCII characters are also highlighted.

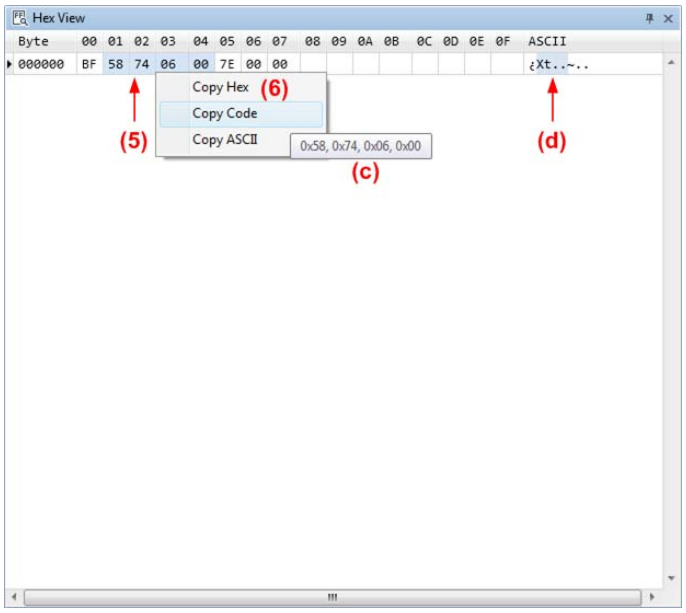

Figure 9.14 Copy Hex View Data

4. Now select a **byte range** as shown above **(5)**. Right-click **(6)** to open the **context menu** and view the **values** **(c)** when hovering over the single items. View the selected **ASCII characters** on the right side **(d)**.

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9.3.2 Recommendation when To Use the Hex View

The Hex View is the appropriate tool to monitor long messages as CAN FD (e.g., 64 bytes) or MOST messages (MHP or AMS messages), e.g., if you have a byte oriented protocol.

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Chapter 10 Tools

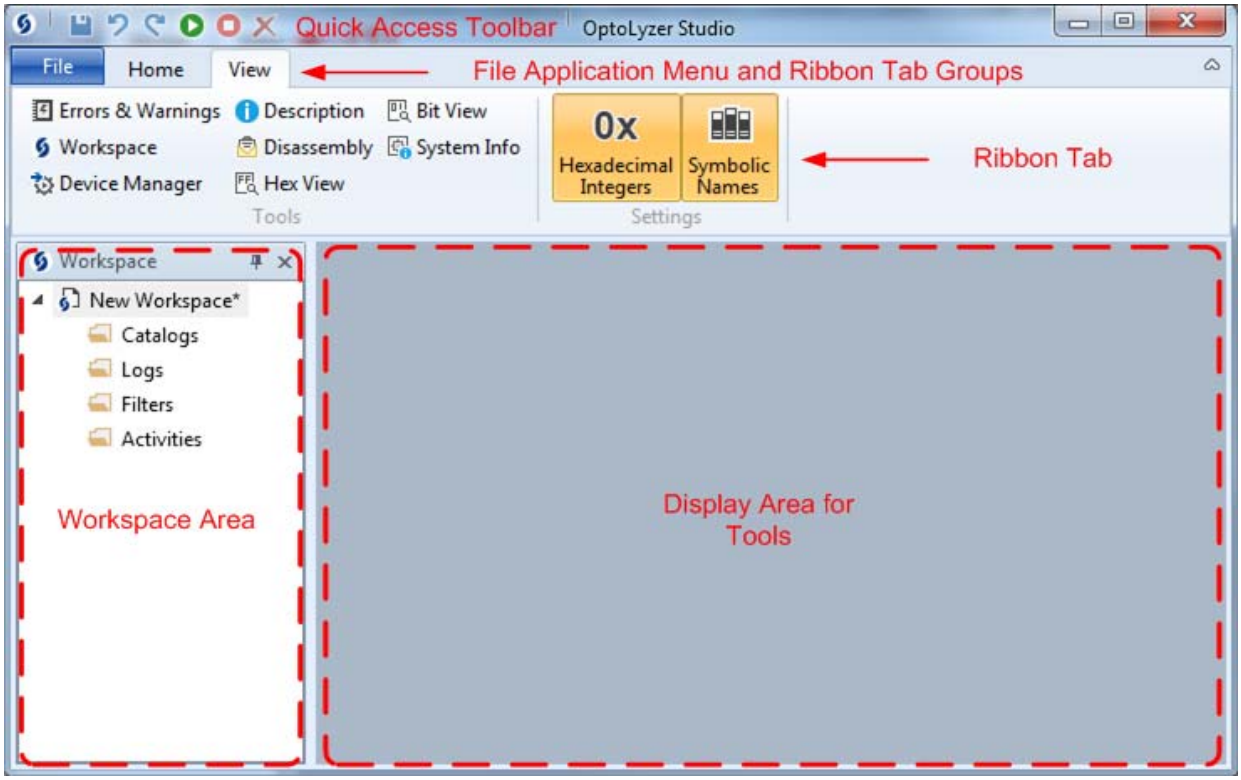

Figure 10.1 OptoLyzer Studio - Overview

10.1 Quick Access Toolbar

Provides one-click access to

- Save
- Undo
- Redo
- Start **online** monitoring of received messages via connected bus system interfaces in a Trace View (Chapter 5, "Guided Tour through Trace View - Monitor Messages," on page 23).
- Stop **online** monitoring (once stopped online monitoring cannot be continued in the same Trace View).
- Clear data shown in an **online** Trace View.

Also additional ribbon tabs can be accessed (not visible in Figure 10.1 but e.g., in Figure 5.5 Online Monitoring on page 26 and in Figure 10.2). The function behind depends on which window is selected. This means, e.g., Undo can reload either a deleted filter (if Undo is clicked in the Filter tool) or a deleted activity (if Undo is clicked in the Activity tool).

10.2 File Application Menu and Ribbon Tab Groups

Beneath the title and the quick access toolbar a combination of a traditional menu bar with a ribbon provides easy access to different command groups. Furthermore ribbons are added in case additional tools (e.g., Trace View, Graph, Activity, Filter) are opened.

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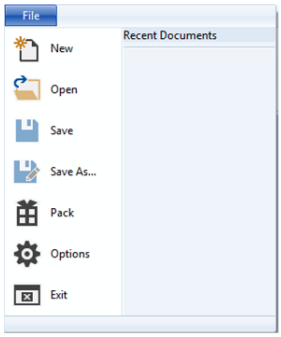
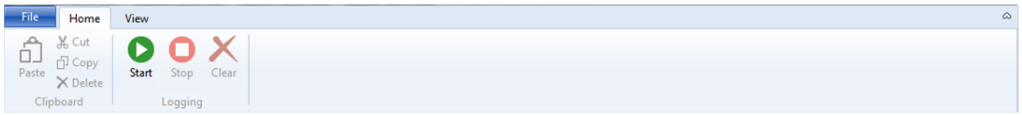
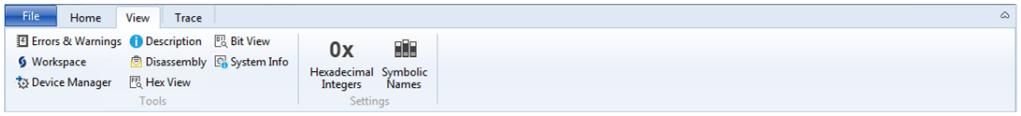
File Menu



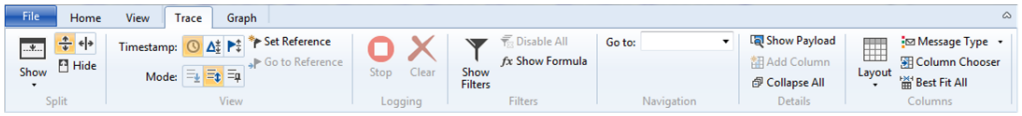
Home Ribbon



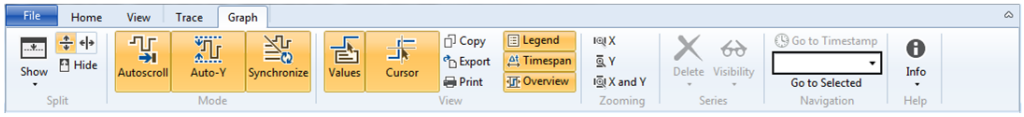
View Ribbon



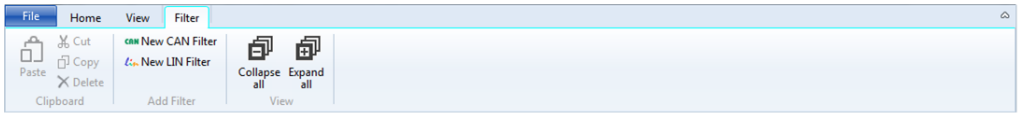
Trace Ribbon



Graph Ribbon



Filter Ribbon



Activity Ribbon

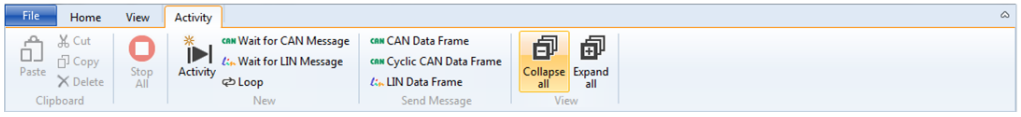


Figure 10.2 Ribbon Tabs

The table below describes all ribbon tabs and lists the **most important** functions/tools (i.e., not all functions/tools). It can be seen somehow as a guide.

Table 10.1 Ribbon Tabs and Important Functions/Tools

Tab	Menu/Ribbon	Description	Important Functions/Tools
File	Traditional menu	It allows to administrate basic data within OptoLyzer Studio (e.g., workspace, files, license).	■ New ■ Open ■ Save ■ Options with access to license management ■ Exit
Home	Ribbon tab (default)	It provides one-click access to manage online viewing of the connected bus systems and some clipboard functions.	■ Start online monitoring ■ Stop online monitoring ■ Clear Trace View ■ Copy & Paste ■ Delete
View	Ribbon tab (default)	It provides access to all tools that are delivered within OptoLyzer Studio and some settings.	■ Workspace ■ Device Manager ■ Disassembly ■ Hex View ■ Bit View ■ Hex/Dec Switch
Trace	Ribbon tab (default)	This tab group is automatically shown if log files are opened or online viewed.	■ Split functions (Graph) ■ Time stamp functions ■ Reference functions (set, goto) ■ Mode (scroll functions) ■ Logging (Stop and Clear) ■ Enabling/Disabling Filters ■ Customization of Trace View
Graph	Ribbon tab (additional)	This tab group is automatically shown if the trace view is split to monitor dedicated messages/events graphically.	■ Scroll modes ■ View modes ■ Zooming ■ Customization of visibility
Filter	Ribbon tab (additional)	This tab group is automatically shown if existing user-defined filter files are opened or new filter files are created. The filter tool is the place where all user-defined filters are created.	■ Create/modify user-defined Filters ■ Collapse/Expand function
Activity	Ribbon tab (additional)	This tab group is automatically shown if existing activity files are opened or new activity files are created. The activity tool is the place where messages are scheduled, created and sent.	■ Create/modify Activities ■ Start/Stop Activities ■ Collapse/Expand function

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10.3 Workspace

The workspace is the place where all data is stored that refers to it. Thereby files are not copied to a dedicated location on the hard disk but their corresponding references to the files' location are stored in the workspace file. If files are missing they are indicated by a red exclamation mark. By default four virtual folders (described in Section 10.3.1, "Catalogs" up to Section 10.3.5, "Activities") are offered in a tree view to help organizing types of data. Virtual means that no folders are created on the hard disk. If the folders are not needed they can be deleted. Other additional folders can be created if desired. One workspace can be opened in one OptoLyzer Studio instance. The name of the workspace can be modified and is shown in the title bar of the main window.

It is also possible to open traces for viewing purposes without being assigned to the workspace. Modifications within such opened traces will not be stored when closing the workspace.

Common functions like **New**, **Open**, **Save** and **Save As** can be accessed via the **File** menu (Figure 10.2). Saved Workspaces will get file extension *.olsworkspace.

10.3.1 Catalogs

Catalogs contain format descriptions how specific bus data has to be interpreted. Currently CAN and LIN bus catalogs are supported. They have to be created externally and can be added to the workspace via the context menu.

Table 10.2 CAN and LIN Bus Formats

Bus Type	Format	Description
CAN	.dbc	Proprietary format to describe CAN network.
	.xml	Format that has been derived from the *.dbc format and is presented in *.xml format.
LIN	.ldf	Format description that has been specified by a LIN consortium.

10.3.2 Log Files

Log files contain messages of supported protocols (right now CAN and LIN protocols), messages that have been created within the application (e.g., in the tool Activity) and system messages that are created if e.g., something has gone wrong when creating messages in the Trace View. It is possible to have separate files for the different protocols or one file containing data of both protocols. Log files can be added to a workspace respectively to the **Trace** folder. In addition, they can be copied, renamed etc. By default, online monitored data is not assigned to this folder. Online data has to be saved first before the data can be assigned to the workspace. For details refer to Chapter 5, "Guided Tour through Trace View - Monitor Messages," on page 23.

If a log file is opened, its data will be shown in a dedicated window. In parallel, a specific ribbon tab **Trace** is shown. It provides all functions to analyze the data in the window. Each message is shown as separate row, each property of a message in a single field.

It is also possible to open a log file within the OptoLyzer Studio without assigning it to the workspace.

Notes: The context menu offers among other typical functions **Exclude from Workspace** and **Delete**. **Exclude from Workspace** (shortcut **Del**) means the file will be removed from the workspace and will no longer be part of the workspace. However the log file itself is still available on the hard disk. This means the data in the log file is still available. **Delete** (no shortcut implemented to avoid misuse) means the log file will be deleted, i.e., is not available on the hard disk anymore. The data is lost.

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10.3.3 Graph

A Graph is able to graphically display the progress of a property of a message as time line. Messages can be bus events identified by the source channel or messages identified by the source channel and the message ID (CAN ID, LIN ID). The values are shown in a Cartesian coordinate system whereby the x-axis represents the time and the y-axis the values. The Graph is using the same source as the Trace window in which context it has be opened.

The Graph provides powerful zooming features that cover zooming in x-axis, y-axis, both axis, autoscroll, synchronize function. Thus it is possible to focus on the values of interest in an illustrative kind of way. The graphical view can also be exported (possible file extensions: .png, .gif, .jpg) or printed as image.

If a Graph is opened, a specific ribbon tab **Graph** is shown.

Section Chapter 7, "Guided Tour through Graph - Monitor Signals," on page 57 shows how to work with the Graph.

10.3.4 Filters

Filters are used to specify the messages which shall be displayed in a Trace View. There are several types of filters.

10.3.4.1 Channel Filters

By default there are channel filters for each bus system of a device that is connected to the OptoLyzer Studio. They allow to filter all messages of a channel of a bus system (CAN1, CAN2 .., LIN1, LIN2..). They are automatically available in each log file and can be made visible via the Trace ribbon item **Show Filters** or by just dragging the splitter at the bottom (that shows the status bar or a log file) up (Chapter 8, "Creating Filters," on page 70). Channel Filters can be enabled or disabled. They are not stored as filter file and thus not listed in the Filters folder.

10.3.4.2 Protocol Filters

They allow to filter all messages of a protocol family, i.e., bus system (CAN, LIN). They are automatically available in each log file and can be made visible via the Trace ribbon item **Show Filters** or by just dragging the splitter at the bottom (that shows the status bar or a log file) up (Chapter 8, "Creating Filters," on page 70). Protocol Filters can be enabled or disabled. They are not stored as filter file and thus not listed in the Filters folder.

10.3.4.3 User-defined Filters

They are defined by the user and stored in a filter file whereby the name is arbitrary. User-defined filters can be created for each supported bus system, i.e., either for a CAN bus system or a LIN bus system. Filters contain conditions that refer to message properties. A message property can be a property of the raw message (e.g., ID, Direction) or a signal/parameter formed from Catalog information. The mode of user-defined filters can be:

- Disabled: The filter is not used.
- Pass Filter: The messages/events matching the filter conditions will be displayed (if not blocked by some other filters). All other messages will be blocked.
- Blocking Filter: The messages/events matching the filter conditions will not be displayed. All other messages are displayed (if not blocked by some other filters). However blocking filters are protocol specific, i.e., a CAN Filter will not block any LIN message.

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User-defined Filters can be added or created in the OptoLyzer Studio and will be stored as filter file (file extension ***.olsfilter**) within the workspace. They are available in each Trace View and are ready to be used. The User-defined Filters can be made visible via the Trace ribbon item **Show Filters** or by just dragging the splitter at the bottom (that shows the status bar or a log file) up (Chapter 8, "Creating Filters," on page 70).

If a User-defined Filter file is opened, a dedicated window, the Filter Editor opens. In parallel, a specific ribbon tab **Filter** is shown. It allows to create CAN or LIN filters and to collapse or expand the filters.

Notes: When working with Filter specific rules have to be kept in mind to understand the concept. Refer to 8.1 Good To Know When Working with Filters on page 70.

Section Chapter 8, "Creating Filters," on page 70 shows how to work with Filters.

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10.3.5 Activities

Activities are defined by the user and stored in an activity file (whereby the name is arbitrary) and thus perform actions. A typical example of an activity might be sending of a generated message depending on a time target. It is possible to create complex structures of conditions to describe the desired behavior. Activities can be concatenated conditions that are executed sequentially or independent conditions that can be executed in parallel.

The OptoLyzer Studio provides:

- A set of predefined activity templates for the supported bus systems. They can be used for the connected devices. Examples are Wait for CAN Message, Wait for LIN Message, CAN Data Frame, LIN Data Frame.
- Some generic actions (as e.g., delay and loop). They do not refer to connected devices.

Activities that cannot be executed because of missing devices are indicated by a red rectangle.

Table 10.3 Supported Message Types and Generic Actions

Message Type	Bus Type/Generic	Description
Empty Action	Generic	Placeholder for new Activity
Send Message	CAN, LIN	A message will be sent.
Wait Message	CAN, LIN	The system will wait till a specified message is coming in.
Delay	Generic	Just waiting for a period of time.
Loop	Generic	Scheduled activities will be restarted again and again.
LIN Switch Schedule Table Action	LIN	Action that requires a *.ldf file and switches the schedule table of a running LIN Master. The LIN device must be in master mode.
LIN Wakeup Action	LIN	Dedicated LIN message that triggers a LIN network to wake up.
LIN GoToSleep Action	LIN	Dedicated LIN message that brings a running LIN Master into sleep mode after transmitting a GoToSleep message.
LIN Restart Action	LIN	Dedicated LIN message that restarts the LIN driver of a device (resets the schedule, set all message buffers to default values, flushes all diagnostic queues, ...).

Section Chapter 6, "Guided Tour through Activity - Send a Message," on page 38 shows how to work with the Activity.

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Activities can only be used if the corresponding editor window is opened (Chapter 6, "Guided Tour through Activity - Send a Message," on page 38). In parallel, a specific ribbon tab **Activity** is shown.

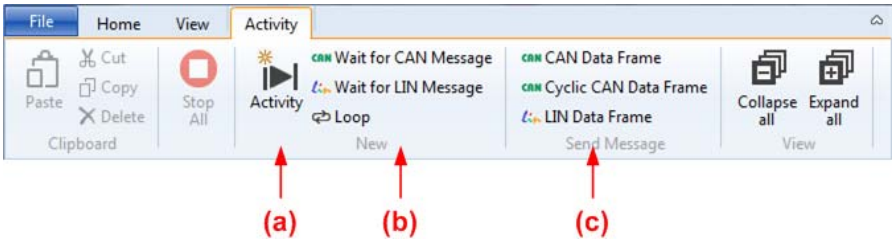

Figure 10.3 Activity Ribbon

The Activity ribbon provides a generic Activity button **(a)** that adds an empty template. In this case the Activity has to be designed from scratch. Other groups **(b)**, **(c)** provide access to predefined Activity templates for dedicated use cases (Chapter 6, "Guided Tour through Activity - Send a Message," on page 38 shows some examples). In addition, the ribbon allows to modify or to delete existing activities and to collapse or expand the activities.

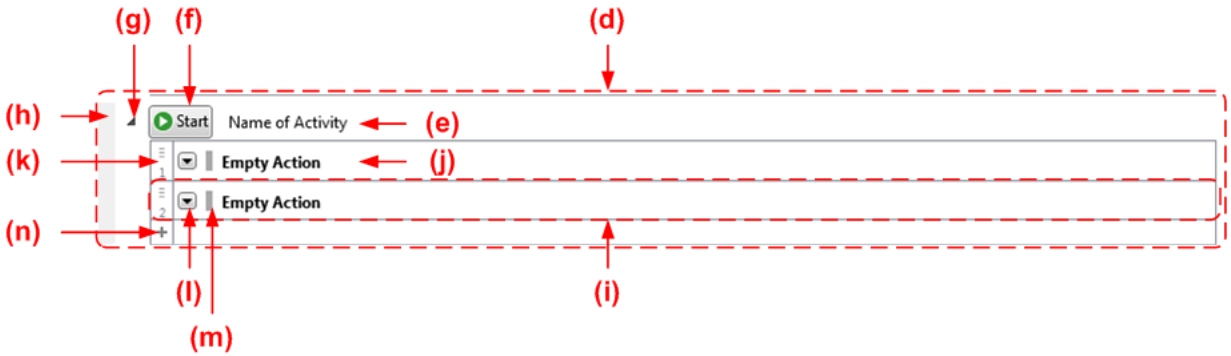

Figure 10.4 Activity - Graphical Overview - Example

After clicking the **Activity** button in the Activity ribbon, an Activity is added in the window. The single elements shown in the window are described in the table below.

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Table 10.4 Graphical Elements of an Activity

Letter	States	Description
(d)		Each click on Activity in the Activity ribbon adds one Activity.
(e)		Name of the Activity. If an Activity is added the first time a default name is inserted automatically. This default name depends on which Activity is added. The name can be modified by just clicking in the input field and entering the name as desired.
(f)	Start Send	Activity button. There are two types of buttons Start: This type of button is shown for: ■ Sequences (i.e., Activity consists of more than one action) ■ Wait for CAN Message ■ Wait for LIN Message ■ Loop Send: This type of button is shown for **Send Messages**: ■ CAN Data Frame ■ Cyclic CAN Data Frame ■ LIN Data Frame
(g)	Expanded Collapsed	Expand/Collapse button ■ Expanded: All details are visible. ■ Collapsed: The handle, the exclamation mark (if available), the expand/collapse button, the Activity button and the name are visible.
(h)		The handle is a graphical element to select an Activity and thus allows clipboard actions.
(i)		An Action is part of an Activity. It stands for one dedicated action that has to fulfill one task. This can be a: ■ Send Message (different types) ■ Wait Message (different types) ■ Delay ■ Loop ■ LIN Switch Schedule Table Action ■ LIN Wakeup Action ■ LIN GoToSleep Action ■ LIN Restart Action If several actions are covered in one Activity, they are enumerated and build a sequence.
(j)		Name of the Action. If an Action is added the first time a default name is inserted automatically. This default name depends on which Action is added. The name can be modified by just clicking in the input field and entering the name as desired.
(k)		The handle is a graphical element to select an Action and thus allows clipboard actions. In addition, an Action can be moved within an Activity window.
(l)		Drop-down list allowing to select an Action.
(m)	green gray	Indicator of an Action (if the **Activity** consists of more **Actions**) or of an **Activity** (if the **Activity** consists of one **Action**). A green color shows an activity of an **Action**. A gray color shows an inactivity of an **Action**.
(n)		Button to extend the Activity. If clicked an **Empty Action** is added. This **Empty Action** has to be customized as desired.

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10.4 Errors & Warnings

The Errors & Warnings Tool is the central output view within the OptoLyzer Studio to display errors, warnings and information. Details are presented about the state of the OptoLyzer Studio and its loaded plug-ins.

Notes: Trace Errors are not shown in this tool as they are created if e.g., something has gone wrong when creating messages in the Trace View.

10.4.1 How To Start the Errors & Warnings Tool

To start the **Errors & Warnings** tool follow these steps.

Figure 10.5 Start Errors & Warnings

1. After starting of the OptoLyzer Studio switch to the **View** ribbon (if necessary) and click **Errors & Warnings** **(1)**.

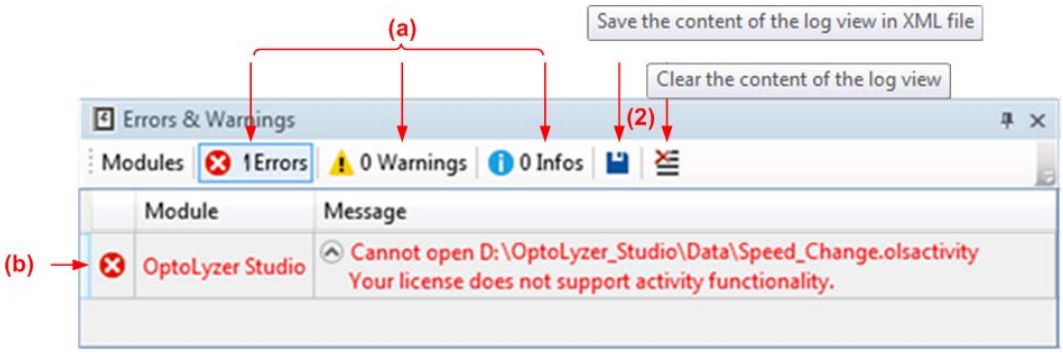

Figure 10.6 Example of an Error Message

The Errors & Warnings tool is opened. Errors, warnings and information are arranged as checkable buttons **(a)**. When checked, the events of the checked type are displayed. Figure 10.6 shows one example of an error message and how it is presented within the tool **(b)**. In addition, the module can be shown if desired (check **Modules**).

2. Just click the tab of interest to view its errors, warnings or information if available.
3. Hover over the **Save** (content is stored in an XML file) and **Clear** button to view the tool tip **(2)**. Click the respective button if desired.

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10.5 Description

The **Description** is the central tool within the OptoLyzer Studio to present additional descriptions if available. The content changes depending on which tool has the focus within OptoLyzer Studio. For example, if you open the Disassembly (Section 9.1, "Disassembly," on page 90) and select a property, additional descriptions are presented. If you open the Device Manager or the System Info and select a device you get details about the selected device.

10.5.1 How To Use the Description

To start the **Description** follow these steps.

Figure 10.7 Start Description

1. After starting of the OptoLyzer Studio switch to the **View** ribbon (if necessary) and click **Description (1)**.

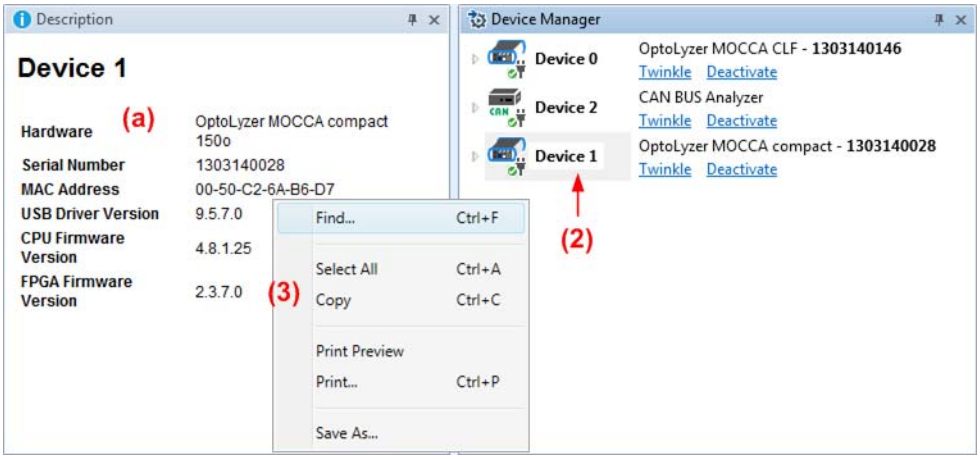

Figure 10.8 Example of a Description

The Description tool is opened. It depends on the selected property whether descriptions are available or not. Figure 10.8 shows one example of an error message and how it is presented within the tool.

2. For example open the Device Manager (as described in Section 5.1, "Start the OptoLyzer Studio for the First Time," on page 23) and **select a connected device (2)**. The Description shows the device description **(a)**.

3. **Right-click** in the Description to view the features provided in the **context menu (3)**. Select the respective item as desired.

10.6 System Info

The System Info provides information about the **current state** of the connected devices and the buses which can be accessed by those devices. The connected devices are arranged as hierarchical tree. Each connected device type is indicated by a specific icon that changes when a device is disconnected. The name, the type of the device and its state are shown. Each channel of a connected device is arranged in a separate sub branch. These branches list the channel name, the state indicator and controls for device actions, which can be performed on the channel. Each channel branch contains the bus properties as child items. It depends on the type of the device whether device actions are supported or not. The following table lists the device actions of the supported devices.

Table 10.5 Supported Device and Channel Actions

Device	Channel	Actions
OptoLyzer MOCCA Device		■ Twinkle: Triggers the twinkling of the Active LED.
		■ Relay: Toggles the relay.
	CAN	■ -
	LIN	■ Wakeup
Microchip CAN Bus Analyzer	CAN	■ Terminator: Indicated Enabled/Disabled Terminator (read only)

Table 10.6 Indicators of Supported Devices

Device	Channel	Indicator	Description
OptoLyzer MOCCA Device		Device State	■ States: Connected/Not Connected
	CAN	Channel State	■ Green: Channel sends/receives properly data. ■ Yellow: No activity is detected for this channel. ■ Red: Channel sends/receives data but transmission shows errors. This state will be kept for 5 seconds and will switch to a yellow icon.
	LIN	Channel State	■ Green: Channel sends/receives properly data. ■ Yellow: There is no activity detected for this channel. ■ Red: Channel sends/receives data but transmission shows errors. This state will be kept for 5 seconds and will switch to a yellow icon.
Microchip CAN Bus Analyzer		Device State	■ States: Connected/Not Connected
	CAN	CAN Channel State	■ Green: Activity is detected on the channel. ■ Yellow: No activity detected.

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10.6.1 How To Use the System Info

To start the **System Info** follow these steps.

Figure 10.9 Start System Info

1. After starting of the OptoLyzer Studio switch to the **View** ribbon (if necessary) and click **System Info** (1). The System Info tool is opened.

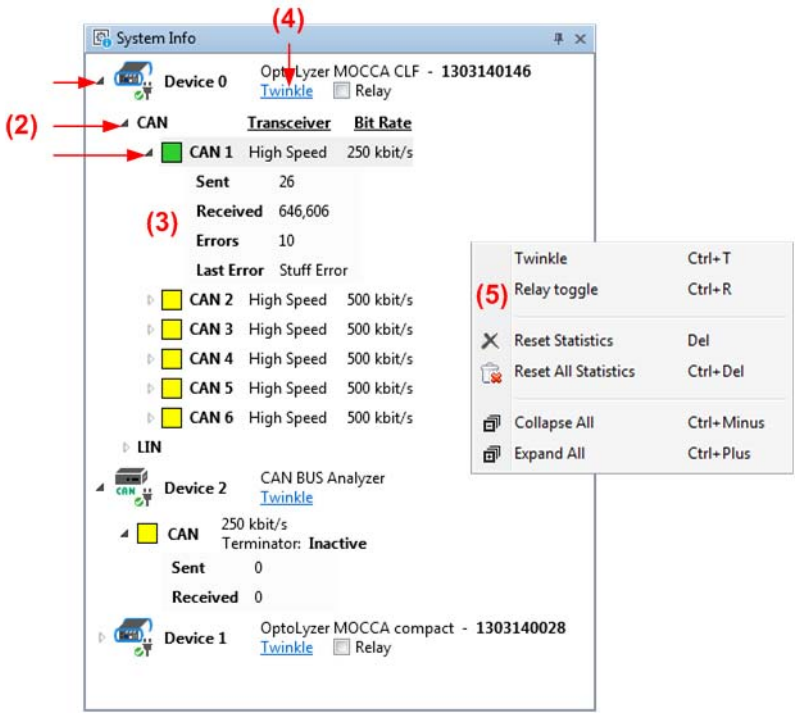

Figure 10.10 Example of a System Info

2. Click the small triangles **(2)** in front of the device and the channels to view the details.
3. View the **statistics** of the channel **(3)**.
4. Click the **twinkle** button of the OptoLyzer MOCCA device to identify the respective device on your desk **(4)**.
5. **Right-click** in the System Info to view the features provided in the **context menu (5)**. Select the respective item as desired.

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Chapter 11 Revision History

Table 11.1 Customer Revision History

REVISION LEVEL	SECTION/FIGURE/ ENTRY	CORRECTION
60001370A	All	Initial version

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Further Information

For more information on K2L automotive products, including integrated circuits, software, and MOST® development tools and modules, visit our web site: http://www.K2L.de. Direct contact information is available at: http://www.K2L.de/contact.

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